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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for nonprovisional applications under 37 CFR § 1 53(b))

Attorney Docket No.	**210121.419C7**
First Inventor or Application Identifier	**Tony N. Frudakis**
Title	COMPOSITIONS AND METHODS FOR THE TREATMENT AND DIAGNOSIS OF BREAST CANCER
Express Mail Label No.	**EL487465173US**

APPLICATION ELEMENTS
See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

1. [ ] General Authorization Form & Fee Transmittal *(Submit an original and a duplicate for fee processing)*

2. [X] Specification [Total Pages] **57** *(preferred arrangement set forth below)*
   - Descriptive Title of the Invention
   - Cross References to Related Applications
   - Statement Regarding Fed sponsored R & D
   - Reference to Microfiche Appendix
   - Background of the Invention
   - Brief Summary of the Invention
   - Brief Description of the Drawings *(if filed)*
   - Detailed Description
   - Claim(s)
   - Abstract of the Disclosure

3. [X] Drawing(s) *(35 USC 113)* [Total Sheets] **25**

4. [ ] Oath or Declaration [Total Pages]
   a. [ ] Newly executed (original or copy)
   b. [ ] Copy from a prior application (37 CFR 1.63(d)) *(for continuation/divisional with Box 17 completed)*
      i. [ ] **DELETION OF INVENTOR(S)** Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b)

5. [ ] Incorporation By Reference *(useable if box 4b is checked)* The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered to be part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

6. [ ] Microfiche Computer Program *(Appendix)*

7. Nucleotide and Amino Acid Sequence Submission *(if applicable, all necessary)*
   a. [X] Computer-Readable Copy
   b. [X] Paper Copy (identical to computer copy)
   c. [X] Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. [ ] Assignment Papers (cover sheet & document(s))
9. [ ] 37 CFR 3.73(b) Statement *(when there is an assignee)* [ ] Power of Attorney
10. [ ] English Translation Document *(if applicable)*
11. [ ] Information Disclosure Statement (IDS)/PTO-1449 [ ] Copies of IDS Citations
12. [ ] Preliminary Amendment
13. [X] Return Receipt Postcard
14. [ ] Small Entity Statement(s) [ ] Statement filed in prior application, Status still proper and desired
15. [ ] Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
16. [X] Other: **Certificate of Express Mail**

17. **If a CONTINUING APPLICATION**, *check appropriate box and supply the requisite information below and in a preliminary amendment*

[ ] Continuation [ ] Divisional [X] Continuation-In-Part (CIP) of prior Application No.: **09/429,755**

Prior application information: Examiner **(NOT ASSIGNED)** Group / Art Unit **1641**

[ ] Claims the benefit of Provisional Application No. _____

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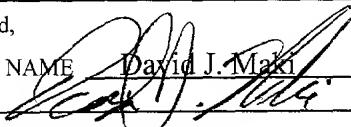
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Filed   :   March 23, 2000

For   :   COMPOSITIONS AND METHODS FOR THE TREATMENT AND DIAGNOSIS OF BREAST CANCER

Docket No.   :   210121.419C7

Date   :   March 23, 2000

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      Respectfully submitted,

      Seed Intellectual Property Law Group PLLC

Judith A. Breaks/Jeanette West/Susan Johnson

Enclosures:
     Postcard
     Form PTO/SB/05
     Specification, Claims, Abstract (57 pages)
     25 pages of Drawings (Figs. 1-24)
     Declaration re Sequence Listing
     Computer Diskette Containing Sequence Listing
     Hard Copy of Sequence Listing (112 pages)

COMPOSITIONS AND METHODS FOR THE TREATMENT
AND DIAGNOSIS OF BREAST CANCER

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of U.S. Patent Application No. 09/429,755, filed October 28, 1999, which is a continuation-in-part of U.S. Patent Application No. 09/289,198, filed April 9, 1999, which is a continuation-in-part of U.S. Patent Application No. 09/062,451, filed April 17, 1998, which is a continuation in part of U.S. Patent Application No. 08/991,789, filed December 11, 1997, which is a continuation-in-part of U.S. Patent Application No. 08/838,762, filed April 9, 1997, which claims priority from International Patent Application No. PCT/US97/00485, filed January 10, 1997, and is a continuation-in-part of U.S. Patent Application No. 08/700,014, filed August 20, 1996, which is a continuation-in-part of U.S. Patent Application No. 08/585,392, filed January 1, 1996.

TECHNICAL FIELD

The present invention relates generally to the detection and therapy of breast cancer. The invention is more specifically related to nucleotide sequences that are preferentially expressed in breast tumor tissue and to polypeptides encoded by such nucleotide sequences. The nucleotide sequences and polypeptides may be used in vaccines and pharmaceutical compositions for the prevention and treatment of breast cancer. The polypeptides may also be used for the production of compounds, such as antibodies, useful for diagnosing and monitoring the progression of breast cancer in a patient.

BACKGROUND OF THE INVENTION

Breast cancer is a significant health problem for women in the United States and throughout the world. Although advances have been made in detection and treatment of the disease, breast cancer remains the second leading cause of cancer-related deaths in women, affecting more than 180,000 women in the United States each year.

For women in North America, the life-time odds of getting breast cancer are now one in eight.

No vaccine or other universally successful method for the prevention or treatment of breast cancer is currently available. Management of the disease currently relies on a combination of early diagnosis (through routine breast screening procedures) and aggressive treatment, which may include one or more of a variety of treatments such as surgery, radiotherapy, chemotherapy and hormone therapy. The course of treatment for a particular breast cancer is often selected based on a variety of prognostic parameters, including an analysis of specific tumor markers. *See, e.g.*, Porter-Jordan and Lippman, *Breast Cancer* 8:73-100 (1994). However, the use of established markers often leads to a result that is difficult to interpret, and the high mortality observed in breast cancer patients indicates that improvements are needed in the treatment, diagnosis and prevention of the disease.

Accordingly, there is a need in the art for improved methods for therapy and diagnosis of breast cancer. The present invention fulfills these needs and further provides other related advantages.

SUMMARY OF THE INVENTION

Briefly stated, the subject invention provides compositions and methods for the diagnosis and therapy of breast cancer. In one aspect, isolated polynucleotides are provided, comprising (a) a nucleotide sequence preferentially expressed in breast cancer tissue, relative to normal tissue; (b) a variant of such a sequence, as defined below; or (c) a nucleotide sequence encoding an epitope of a polypeptide encoded by at least one of the above sequences. In one embodiment, the isolated polynucleotide comprises a human endogenous retroviral sequence recited in SEQ ID NO:1. In other embodiments, the isolated polynucleotide comprises a sequence recited in any one of SEQ ID NO: 3-26, 28-77, 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-240, 243-245, 247, 250, 251, 253, 255, 257-266, 268, 269, 271-273, 275, 276, 278, 280, 281, 284, 288, 291-298, 301-303, 307, 313, 314, 316 and 317.

In related embodiments, the isolated polynucleotide encodes an epitope of a polypeptide, wherein the polypeptide is encoded by a nucleotide sequence that: (a) hybridizes to a sequence recited in any one of SEQ ID NO: 1, 3-26, 28-77, 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218,

5   219, 221-240, 243-245, 247, 250, 251, 253, 255, 257-266, 268, 269, 271-273, 275, 276, 278, 280, 281, 284, 288, 291-298, 301-303, 307, 313, 314, 316 and 317 under stringent conditions; and (b) is at least 80% identical to a sequence recited in any one of SEQ ID NO: 1, 3-26, 28-77, 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-240, 243-245, 247, 250, 251, 253, 255, 257-266,

10   268, 269, 271-273, 275, 276, 278, 280, 281, 284, 288, 291-298, 301-303, 307, 313, 314, 316 and 317.

In another embodiment, the present invention provides an isolated polynucleotide encoding an epitope of a polypeptide, the polypeptide being encoded by: (a) a nucleotide sequence transcribed from the sequence of SEQ ID NO: 141; or (b) a

15   variant of said nucleotide sequence that contains one or more nucleotide substitutions, deletions, insertions and/or modifications at no more than 20% of the nucleotide positions, such that the antigenic and/or immunogenic properties of the polypeptide encoded by the nucleotide sequence are retained. Isolated DNA and RNA molecules comprising a nucleotide sequence complementary to a polynucleotide as described above

20   are also provided.

In related aspects, the present invention provides recombinant expression vectors comprising a polynucleotide as described above and host cells transformed or transfected with such expression vectors.

In further aspects, polypeptides comprising an amino acid sequence

25   encoded by a polynucleotide as described above, and monoclonal antibodies that bind to such polypeptides are provided. In certain embodiments, the inventive polypeptides comprise an amino acid sequence selected from the group consisting of SEQ ID NO: 299, 300, 304-306, 308 and 315, and variants thereof as defined below.

In yet another aspect, methods are provided for determining the presence

30   of breast cancer in a patient. In one embodiment, the method comprises detecting, within a biological sample, a polypeptide as described above. In another embodiment, the

method comprises detecting, within a biological sample, an RNA molecule encoding a polypeptide as described above. In yet another embodiment, the method comprises (a) intradermally injecting a patient with a polypeptide as described above; and (b) detecting an immune response on the patient's skin and therefrom detecting the presence of breast

5 cancer in the patient. In further embodiments, the present invention provides methods for determining the presence of breast cancer in a patient as described above wherein the polypeptide is encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86, 144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, 241, 242, 246, 248, 249, 252, 256, 267, 270, 274, 277, 279, 282, 283, 285-287, 289, 290 and

10 sequences that hybridize thereto under stringent conditions.

In a related aspect, diagnostic kits useful in the determination of breast cancer are provided. The diagnostic kits generally comprise either one or more monoclonal antibodies as described above, or one or more monoclonal antibodies that bind to a polypeptide encoded by a nucleotide sequence selected from the group

15 consisting of sequences provided in SEQ ID NO: 78-86, 144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, 241, 242 and 246, 248, 249, 252, 256, 267, 270, 274, 277, 279, 282, 283, 285-287, 289, 290 and a detection reagent.

Diagnostic kits are also provided that comprise a first polymerase chain reaction primer and a second polymerase chain reaction primer, at least one of the

20 primers being specific for a polynucleotide described herein. In one embodiment, at least one of the primers comprises at least about 10 contiguous nucleotides of a polynucleotide as described above, or a polynucleotide encoding a polypeptide encoded by a sequence selected from the group consisting of SEQ ID NO: 78-86, 144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, 241, 242 246, 248, 249, 252, 256, 267, 270,

25 274, 277, 279, 282, 283, 285-287, 289 and 290.

Within another related aspect, the diagnostic kit comprises at least one oligonucleotide probe, the probe being specific for a polynucleotide described herein. In one embodiment, the probe comprises at least about 15 contiguous nucleotides of a polynucleotide as described above, or a polynucleotide selected from the group

30 consisting of SEQ ID NO: 78-86, 144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217,

220, 241, 242 246, 248, 249, 252, 256, 267, 270, 274, 277, 279, 282, 283, 285-287, 289 and 290.

In another related aspect, the present invention provides methods for monitoring the progression of breast cancer in a patient. In one embodiment, the method comprises: (a) detecting an amount, in a biological sample, of a polypeptide as described above at a first point in time; (b) repeating step (a) at a subsequent point in time; and (c) comparing the amounts of polypeptide detected in steps (a) and (b), and therefrom monitoring the progression of breast cancer in the patient. In another embodiment, the method comprises (a) detecting an amount, within a biological sample, of an RNA molecule encoding a polypeptide as described above at a first point in time; (b) repeating step (a) at a subsequent point in time; and (c) comparing the amounts of RNA molecules detected in steps (a) and (b), and therefrom monitoring the progression of breast cancer in the patient. In yet other embodiments, the present invention provides methods for monitoring the progression of breast cancer in a patient as described above wherein the polypeptide is encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86, 144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, 241, 242, 246, 248, 249, 252, 256, 267, 270, 274, 277, 279, 282, 283, 285-287, 289, 290 and sequences that hybridize thereto under stringent conditions.

In still other aspects, pharmaceutical compositions, which comprise a polypeptide as described above in combination with a physiologically acceptable carrier, and vaccines, which comprise a polypeptide as described above in combination with an immunostimulant or adjuvant, are provided. In yet other aspects, the present invention provides pharmaceutical compositions and vaccines comprising a polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86, 144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, 241, 242 and 246, 248, 249, 252, 256, 267, 270, 274, 277, 279, 282, 283, 285-287, 289, 290 and sequences that hybridize thereto under stringent conditions.

In related aspects, the present invention provides methods for inhibiting the development of breast cancer in a patient, comprising administering to a patient a pharmaceutical composition or vaccine as described above.

These and other aspects of the present invention will become apparent upon reference to the following detailed description and attached drawings. All references disclosed herein are hereby incorporated by reference in their entirety as if each was incorporated individually.

5   BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows the differential display PCR products, separated by gel electrophoresis, obtained from cDNA prepared from normal breast tissue (lanes 1 and 2) and from cDNA prepared from breast tumor tissue from the same patient (lanes 3 and 4). The arrow indicates the band corresponding to B18Ag1.

10   Figure 2 is a northern blot comparing the level of B18Ag1 mRNA in breast tumor tissue (lane 1) with the level in normal breast tissue.

Figure 3 shows the level of B18Ag1 mRNA in breast tumor tissue compared to that in various normal and non-breast tumor tissues as determined by RNase protection assays.

15   Figure 4 is a genomic clone map showing the location of additional retroviral sequences obtained from ends of XbaI restriction digests (provided in SEQ ID NO:3 - SEQ ID NO:10) relative to B18Ag1.

Figures 5A and 5B show the sequencing strategy, genomic organization and predicted open reading frame for the retroviral element containing B18Ag1.

20   Figure 6 shows the nucleotide sequence of the representative breast tumor-specific cDNA B18Ag1.

Figure 7 shows the nucleotide sequence of the representative breast tumor-specific cDNA B17Ag1.

Figure 8 shows the nucleotide sequence of the representative breast tumor-specific cDNA B17Ag2.

25   Figure 9 shows the nucleotide sequence of the representative breast tumor-specific cDNA B13Ag2a.

Figure 10 shows the nucleotide sequence of the representative breast tumor-specific cDNA B13Ag1b.

Figure 11 shows the nucleotide sequence of the representative breast tumor-specific cDNA B13Ag1a.

Figure 12 shows the nucleotide sequence of the representative breast tumor-specific cDNA B11Ag1.

Figure 13 shows the nucleotide sequence of the representative breast tumor-specific cDNA B3CA3c.

Figure 14 shows the nucleotide sequence of the representative breast tumor-specific cDNA B9CG1.

Figure 15 shows the nucleotide sequence of the representative breast tumor-specific cDNA B9CG3.

Figure 16 shows the nucleotide sequence of the representative breast tumor-specific cDNA B2CA2.

Figure 17 shows the nucleotide sequence of the representative breast tumor-specific cDNA B3CA1.

Figure 18 shows the nucleotide sequence of the representative breast tumor-specific cDNA B3CA2.

Figure 19 shows the nucleotide sequence of the representative breast tumor-specific cDNA B3CA3.

Figure 20 shows the nucleotide sequence of the representative breast tumor-specific cDNA B4CA1.

Figure 21A depicts RT-PCR analysis of breast tumor genes in breast tumor tissues (lanes 1-8) and normal breast tissues (lanes 9-13) and H_2O (lane 14).

Figure 21B depicts RT-PCR analysis of breast tumor genes in prostate tumors (lane 1, 2), colon tumors (lane 3), lung tumor (lane 4), normal prostate (lane 5), normal colon (lane 6), normal kidney (lane 7), normal liver (lane 8), normal lung (lane 9), normal ovary (lanes 10, 18), normal pancreases (lanes 11, 12), normal skeletal muscle (lane 13), normal skin (lane 14), normal stomach (lane 15), normal testes (lane 16), normal small intestine (lane 17), HBL-100 (lane 19), MCF-12A (lane 20), breast tumors (lanes 21-23), H_2O (lane 24), and colon tumor (lane 25).

Figure 22 shows the recognition of a B11Ag1 peptide (referred to as B11-8) by an anti-B11-8 CTL line.

Figure 23 shows the recognition of a cell line transduced with the antigen B11Ag1 by the B11-8 specific clone A1.

Figure 24 shows recognition of a lung adenocarcinoma line (LT-140-22) and a breast adenocarcinoma line (CAMA-1) by the B11-8 specific clone A1.

DETAILED DESCRIPTION OF THE INVENTION

As noted above, the present invention is generally directed to compositions and methods for the diagnosis, monitoring and therapy of breast cancer. The compositions described herein include polypeptides, polynucleotides and antibodies. Polypeptides of the present invention generally comprise at least a portion of a protein that is expressed at a greater level in human breast tumor tissue than in normal breast tissue (*i.e.*, the level of RNA encoding the polypeptide is at least 2-fold higher in tumor tissue). Such polypeptides are referred to herein as breast tumor-specific polypeptides, and cDNA molecules encoding such polypeptides are referred to as breast tumor-specific cDNAs. Polynucleotides of the subject invention generally comprise a DNA or RNA sequence that encodes all or a portion of a polypeptide as described above, or that is complementary to such a sequence. Antibodies are generally immune system proteins, or fragments thereof, that are capable of binding to a portion of a polypeptide as described above. Antibodies can be produced by cell culture techniques, including the generation of monoclonal antibodies as described herein, or via transfection of antibody genes into suitable bacterial or mammalian cell hosts, in order to allow for the production of recombinant antibodies.

Polypeptides within the scope of this invention include, but are not limited to, polypeptides (and epitopes thereof) encoded by a human endogenous retroviral sequence, such as the sequence designated B18Ag1 (Figure 5 and SEQ ID NO:1). Also within the scope of the present invention are polypeptides encoded by other sequences within the retroviral genome containing B18Ag1 (SEQ ID NO: 141). Such sequences include, but are not limited to, the sequences recited in SEQ ID NO:3 - SEQ ID NO:10. B18Ag1 has homology to the *gag* p30 gene of the endogenous human retroviral element S71, as described in Werner et al., *Virology 174*:225-238 (1990) and also shows homology to about thirty other retroviral gag genes. As discussed in more detail below, the present invention also includes a number of additional breast tumor-

specific polypeptides, such as those encoded by the nucleotide sequences recited in SEQ ID NO: 11-26, 28-77, 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-240, 243-245, 247, 250, 251, 253, 255, 257-266, 268, 269, 271-273, 275, 276, 278, 280, 281, 284, 288, 291-298, 301-303, 307, 313, 314, 316 and 317.

As used herein, the term "polypeptide" encompasses amino acid chains of any length, including full length proteins containing the sequences recited herein. A polypeptide comprising an epitope of a protein containing a sequence as described herein may consist entirely of the epitope, or may contain additional sequences. The additional sequences may be derived from the native protein or may be heterologous, and such sequences may (but need not) possess immunogenic or antigenic properties.

An "epitope," as used herein is a portion of a polypeptide that is recognized (*i.e.*, specifically bound) by a B-cell and/or T-cell surface antigen receptor. Epitopes may generally be identified using well known techniques, such as those summarized in Paul, *Fundamental Immunology*, 3rd ed., 243-247 (Raven Press, 1993) and references cited therein. Such techniques include screening polypeptides derived from the native polypeptide for the ability to react with antigen-specific antisera and/or T-cell lines or clones. An epitope of a polypeptide is a portion that reacts with such antisera and/or T-cells at a level that is similar to the reactivity of the full length polypeptide (*e.g.*, in an ELISA and/or T-cell reactivity assay). Such screens may generally be performed using methods well known to those of ordinary skill in the art, such as those described in Harlow and Lane, *Antibodies: A Laboratory Manual*, Cold Spring Harbor Laboratory, 1988. B-cell and T-cell epitopes may also be predicted via computer analysis. Polypeptides comprising an epitope of a polypeptide that is preferentially expressed in a tumor tissue (with or without additional amino acid sequence) are within the scope of the present invention.

The term "polynucleotide(s)," as used herein, means a single or double-stranded polymer of deoxyribonucleotide or ribonucleotide bases and includes DNA and corresponding RNA molecules, including HnRNA and mRNA molecules, both sense and anti-sense strands, and comprehends cDNA, genomic DNA and recombinant DNA, as well as wholly or partially synthesized polynucleotides. An HnRNA molecule contains introns and corresponds to a DNA molecule in a generally one-to-one manner. An

mRNA molecule corresponds to an HnRNA and DNA molecule from which the introns have been excised. A polynucleotide may consist of an entire gene, or any portion thereof. Operable anti-sense polynucleotides may comprise a fragment of the corresponding polynucleotide, and the definition of "polynucleotide" therefore includes

5   all such operable anti-sense fragments.

The compositions and methods of the present invention also encompass variants of the above polypeptides and polynucleotides.

A polypeptide "variant," as used herein, is a polypeptide that differs from the recited polypeptide only in conservative substitutions and/or modifications, such that

10   the antigenic properties of the polypeptide are retained. In a preferred embodiment, variant polypeptides differ from an identified sequence by substitution, deletion or addition of five amino acids or fewer. Such variants may generally be identified by modifying one of the above polypeptide sequences, and evaluating the antigenic properties of the modified polypeptide using, for example, the representative procedures

15   described herein. Polypeptide variants preferably exhibit at least about 70%, more preferably at least about 90% and most preferably at least about 95% identity (determined as described below) to the identified polypeptides.

As used herein, a "conservative substitution" is one in which an amino acid is substituted for another amino acid that has similar properties, such that one skilled

20   in the art of peptide chemistry would expect the secondary structure and hydropathic nature of the polypeptide to be substantially unchanged. In general, the following groups of amino acids represent conservative changes: (1) ala, pro, gly, glu, asp, gln, asn, ser, thr; (2) cys, ser, tyr, thr; (3) val, ile, leu, met, ala, phe; (4) lys, arg, his; and (5) phe, tyr, trp, his.

25   Variants may also, or alternatively, contain other modifications, including the deletion or addition of amino acids that have minimal influence on the antigenic properties, secondary structure and hydropathic nature of the polypeptide. For example, a polypeptide may be conjugated to a signal (or leader) sequence at the N-terminal end of the protein which co-translationally or post-translationally directs transfer of the protein.

30   The polypeptide may also be conjugated to a linker or other sequence for ease of synthesis, purification or identification of the polypeptide (e.g., poly-His), or to enhance

binding of the polypeptide to a solid support. For example, a polypeptide may be conjugated to an immunoglobulin Fc region.

A nucleotide "variant" is a sequence that differs from the recited nucleotide sequence in having one or more nucleotide deletions, substitutions or additions. Such modifications may be readily introduced using standard mutagenesis techniques, such as oligonucleotide-directed site-specific mutagenesis as taught, for example, by Adelman et al. (*DNA, 2*:183, 1983). Nucleotide variants may be naturally occurring allelic variants, or non-naturally occurring variants. Variant nucleotide sequences preferably exhibit at least about 70%, more preferably at least about 80% and most preferably at least about 90% identity (determined as described below) to the recited sequence.

The breast tumor antigens provided by the present invention include variants that are encoded by DNA sequences which are substantially homologous to one or more of the DNA sequences specifically recited herein. "Substantial homology," as used herein, refers to DNA sequences that are capable of hybridizing under moderately stringent conditions. Suitable moderately stringent conditions include prewashing in a solution of 5X SSC, 0.5% SDS, 1.0 mM EDTA (pH 8.0); hybridizing at 50°C-65°C, 5X SSC, overnight or, in the event of cross-species homology, at 45°C with 0.5X SSC; followed by washing twice at 65°C for 20 minutes with each of 2X, 0.5X and 0.2X SSC containing 0.1% SDS. Such hybridizing DNA sequences are also within the scope of this invention, as are nucleotide sequences that, due to code degeneracy, encode an immunogenic polypeptide that is encoded by a hybridizing DNA sequence.

Two nucleotide or polypeptide sequences are said to be "identical" if the sequence of nucleotides or amino acid residues in the two sequences is the same when aligned for maximum correspondence as described below. Comparisons between two sequences are typically performed by comparing the sequences over a comparison window to identify and compare local regions of sequence similarity. A "comparison window" as used herein, refers to a segment of at least about 20 contiguous positions, usually 30 to about 75, 40 to about 50, in which a sequence may be compared to a reference sequence of the same number of contiguous positions after the two sequences are optimally aligned.

Optimal alignment of sequences for comparison may be conducted using the Megalign program in the Lasergene suite of bioinformatics software (DNASTAR, Inc., Madison, WI), using default parameters. This program embodies several alignment schemes described in the following references: Dayhoff, M.O. (1978) A model of evolutionary change in proteins – Matrices for detecting distant relationships. In Dayhoff, M.O. (ed.) Atlas of Protein Sequence and Structure, National Biomedical Resarch Foundaiton, Washington DC Vol. 5, Suppl. 3, pp. 345-358; Hein J. (1990) Unified Approach to Alignment and Phylogenes pp. 626-645 *Methods in Enzymology* vol. 183, Academic Press, Inc., San Diego, CA; Higgins, D.G. and Sharp, P.M. (1989) Fast and sensitive multiple sequence alignments on a microcomputer *CABIOS 5*:151-153; Myers, E.W. and Muller W. (1988) Optimal alignments in linear space *CABIOS 4*:11-17; Robinson, E.D. (1971) *Comb. Theor 11*:105; Santou, N. Nes, M. (1987) The neighbor joining method. A new method for reconstructing phylogenetic trees *Mol. Biol. Evol. 4*:406-425; Sneath, P.H.A. and Sokal, R.R. (1973) *Numerical Taxonomy – the Principles and Practice of Numerical Taxonomy*, Freeman Press, San Francisco, CA; Wilbur, W.J. and Lipman, D.J. (1983) Rapid similarity searches of nucleic acid and protein data banks *Proc. Natl. Acad., Sci. USA 80*:726-730.

Preferably, the "percentage of sequence identity" is determined by comparing two optimally aligned sequences over a window of comparison of at least 20 positions, wherein the portion of the polynucleotide sequence in the comparison window may comprise additions or deletions (i.e. gaps) of 20 percent or less, usually 5 to 15 percent, or 10 to 12 percent, as compared to the reference sequences (which does not comprise additions or deletions) for optimal alignment of the two sequences. The percentage is calculated by determining the number of positions at which the identical nucleic acid bases or amino acid residue occurs in both sequences to yield the number of matched positions, dividing the number of matched positions by the total number of positions in the reference sequence (i.e. the window size) and multiplying the results by 100 to yield the percentage of sequence identity. In general, polynucleotides encoding all or a portion of the polypeptides described herein may be prepared using any of several techniques. For example, cDNA molecules encoding such polypeptides may be cloned on the basis of the breast tumor-specific expression of the corresponding mRNAs, using differential display PCR. This technique compares the amplified

products from RNA template prepared from normal and breast tumor tissue. cDNA may be prepared by reverse transcription of RNA using a $(dT)_{12}AG$ primer. Following amplification of the cDNA using a random primer, a band corresponding to an amplified product specific to the tumor RNA may be cut out from a silver stained gel and

5   subcloned into a suitable vector (*e.g.*, the T-vector, Novagen, Madison, WI). Polynucleotides encoding all or a portion of the breast tumor-specific polypeptides disclosed herein may be amplified from cDNA prepared as described above using the random primers shown in SEQ ID NO.:87-125.

Alternatively, a polynucleotide encoding a polypeptide as described

10 herein (or a portion thereof) may be amplified from human genomic DNA, or from breast tumor cDNA, via polymerase chain reaction. For this approach, B18Ag1 sequence-specific primers may be designed based on the sequence provided in SEQ ID NO:1, and may be purchased or synthesized. One suitable primer pair for amplification from breast tumor cDNA is (5'ATG GCT ATT TTC GGG GGC TGA CA) (SEQ ID NO:126) and

15 (5'CCG GTA TCT CCT CGT GGG TAT T) (SEQ ID NO:127). An amplified portion of B18Ag1 may then be used to isolate the full length gene from a human genomic DNA library or from a breast tumor cDNA library, using well known techniques, such as those described in Sambrook et al., *Molecular Cloning: A Laboratory Manual*, Cold Spring Harbor Laboratories, Cold Spring Harbor, NY (1989). Other sequences within the

20 retroviral genome of which B18Ag1 is a part may be similarly prepared by screening human genomic libraries using B18Ag1-specific sequences as probes. Nucleotides translated into protein from the retroviral genome shown in SEQ ID NO: 141 may then be determined by cloning the corresponding cDNAs, predicting the open reading frames and cloning the appropriate cDNAs into a vector containing a viral promoter, such as T7.

25 The resulting constructs can be employed in a translation reaction, using techniques known to those of skill in the art, to identify nucleotide sequences which result in expressed protein. Similarly, primers specific for the remaining breast tumor-specific polypeptides described herein may be designed based on the nucleotide sequences provided in SEQ ID NO:11-86, 142-298, 301-303, 307, 313, 314, 316 and 317.

30 Recombinant polypeptides encoded by the DNA sequences described above may be readily prepared from the DNA sequences. For example, supernatants

from suitable host/vector systems which secrete recombinant protein or polypeptide into culture media may be first concentrated using a commercially available filter. Following concentration, the concentrate may be applied to a suitable purification matrix such as an affinity matrix or an ion exchange resin. Finally, one or more reverse phase HPLC steps

5   can be employed to further purify a recombinant polypeptide.

In general, any of a variety of expression vectors known to those of ordinary skill in the art may be employed to express recombinant polypeptides of this invention. Expression may be achieved in any appropriate host cell that has been transformed or transfected with an expression vector containing a polynucleotide that

10   encodes a recombinant polypeptide. Suitable host cells include prokaryotes, yeast and higher eukaryotic cells. Preferably, the host cells employed are *E. coli*, yeast or a mammalian cell line such as COS or CHO.

Such techniques may also be used to prepare polypeptides comprising epitopes or variants of the native polypeptides. For example, variants of a native

15   polypeptide may generally be prepared using standard mutagenesis techniques, such as oligonucleotide-directed site-specific mutagenesis, and sections of the DNA sequence may be removed to permit preparation of truncated polypeptides. Portions and other variants having fewer than about 100 amino acids, and generally fewer than about 50 amino acids, may also be generated by synthetic means, using techniques well known to

20   those of ordinary skill in the art. For example, such polypeptides may be synthesized using any of the commercially available solid-phase techniques, such as the Merrifield solid-phase synthesis method, where amino acids are sequentially added to a growing amino acid chain. *See* Merrifield, *J. Am. Chem. Soc.* 85:2149-2146 (1963). Equipment for automated synthesis of polypeptides is commercially available from suppliers such as

25   Perkin Elmer/Applied BioSystems Division,, Foster City, CA, and may be operated according to the manufacturer's instructions.

In specific embodiments, polypeptides of the present invention encompass amino acid sequences encoded by a polynucleotide having a sequence recited in any one of SEQ ID NO:1, 3-26, 28-77, 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198,

30   200-204, 206, 207, 209-214, 216, 218, 219, 221-240, 243-245, 247, 250, 251, 253, 255, 257-266, 268, 269, 271-273, 275, 276, 278, 280, 281, 284, 288, 291-298, 301-303, 307,

313, 314, 316 and 317, and variants of such polypeptides. Polypeptides within the scope of the present invention also include polypeptides (and epitopes thereof) encoded by DNA sequences that hybridize to a sequence recited in any one of SEQ ID NO:1, 3-26, 28-77, 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-240, 243-245, 247, 250, 251, 253, 255, 257-266, 268, 269, 271-273, 275, 276, 278, 280, 281, 284, 288, 291-298, 301-303, 307, 313, 314, 316 and 317 under stringent conditions, wherein the DNA sequences are at least 80% identical in overall sequence to a recited sequence and wherein RNA corresponding to the nucleotide sequence is expressed at a greater level in human breast tumor tissue than in normal breast tissue. As used herein, "stringent conditions" refers to prewashing in a solution of 6X SSC, 0.2% SDS; hybridizing at 65°C, 6X SSC, 0.2% SDS overnight; followed by two washes of 30 minutes each in 1X SSC, 0.1% SDS at 65°C and two washes of 30 minutes each in 0.2 X SSC, 0.1% SDS at 65°C. Polynucleotides according to the present invention include molecules that encode any of the above polypeptides.

In another aspect of the present invention, antibodies are provided. Such antibodies may be prepared by any of a variety of techniques known to those of ordinary skill in the art. *See, e.g.,* Harlow and Lane, *Antibodies: A Laboratory Manual,* Cold Spring Harbor Laboratory, 1988. In one such technique, an immunogen comprising the polypeptide is initially injected into any of a wide variety of mammals (*e.g.,* mice, rats, rabbits, sheep or goats). In this step, the polypeptides of this invention may serve as the immunogen without modification. Alternatively, particularly for relatively short polypeptides, a superior immune response may be elicited if the polypeptide is joined to a carrier protein, such as bovine serum albumin or keyhole limpet hemocyanin. The immunogen is injected into the animal host, preferably according to a predetermined schedule incorporating one or more booster immunizations, and the animals are bled periodically. Polyclonal antibodies specific for the polypeptide may then be purified from such antisera by, for example, affinity chromatography using the polypeptide coupled to a suitable solid support.

Monoclonal antibodies specific for the antigenic polypeptide of interest may be prepared, for example, using the technique of Kohler and Milstein, *Eur. J. Immunol.* 6:511-519 (1976), and improvements thereto. Briefly, these methods involve

the preparation of immortal cell lines capable of producing antibodies having the desired specificity (*i.e.*, reactivity with the polypeptide of interest). Such cell lines may be produced, for example, from spleen cells obtained from an animal immunized as described above. The spleen cells are then immortalized by, for example, fusion with a myeloma cell fusion partner, preferably one that is syngeneic with the immunized animal. A variety of fusion techniques may be employed. For example, the spleen cells and myeloma cells may be combined with a nonionic detergent for a few minutes and then plated at low density on a selective medium that supports the growth of hybrid cells, but not myeloma cells. A preferred selection technique uses HAT (hypoxanthine, aminopterin, thymidine) selection. After a sufficient time, usually about 1 to 2 weeks, colonies of hybrids are observed. Single colonies are selected and their culture supernatants tested for binding activity against the polypeptide. Hybridomas having high reactivity and specificity are preferred.

Monoclonal antibodies may be isolated from the supernatants of growing hybridoma colonies. In addition, various techniques may be employed to enhance the yield, such as injection of the hybridoma cell line into the peritoneal cavity of a suitable vertebrate host, such as a mouse. Monoclonal antibodies may then be harvested from the ascites fluid or the blood. Contaminants may be removed from the antibodies by conventional techniques, such as chromatography, gel filtration, precipitation, and extraction. The polypeptides of this invention may be used in the purification process in, for example, an affinity chromatography step.

Antibodies may be used, for example, in methods for detecting breast cancer in a patient. Such methods involve using an antibody to detect the presence or absence of a breast tumor-specific polypeptide as described herein in a suitable biological sample. As used herein, suitable biological samples include tumor or normal tissue biopsy, mastectomy, blood, lymph node, serum or urine samples, or other tissue, homogenate, or extract thereof obtained from a patient.

There are a variety of assay formats known to those of ordinary skill in the art for using an antibody to detect polypeptide markers in a sample. *See, e.g.,* Harlow and Lane, *Antibodies: A Laboratory Manual*, Cold Spring Harbor Laboratory, 1988. For example, the assay may be performed in a Western blot format, wherein a protein

preparation from the biological sample is submitted to gel electrophoresis, transferred to a suitable membrane and allowed to react with the antibody. The presence of the antibody on the membrane may then be detected using a suitable detection reagent, as described below.

5   In another embodiment, the assay involves the use of antibody immobilized on a solid support to bind to the polypeptide and remove it from the remainder of the sample. The bound polypeptide may then be detected using a second antibody or reagent that contains a reporter group. Alternatively, a competitive assay may be utilized, in which a polypeptide is labeled with a reporter group and allowed to

10   bind to the immobilized antibody after incubation of the antibody with the sample. The extent to which components of the sample inhibit the binding of the labeled polypeptide to the antibody is indicative of the reactivity of the sample with the immobilized antibody, and as a result, indicative of the concentration of polypeptide in the sample.

The solid support may be any material known to those of ordinary skill in

15   the art to which the antibody may be attached. For example, the solid support may be a test well in a microtiter plate or a nitrocellulose filter or other suitable membrane. Alternatively, the support may be a bead or disc, such as glass, fiberglass, latex or a plastic material such as polystyrene or polyvinylchloride. The support may also be a magnetic particle or a fiber optic sensor, such as those disclosed, for example, in U.S.

20   Patent No. 5,359,681.

The antibody may be immobilized on the solid support using a variety of techniques known to those in the art, which are amply described in the patent and scientific literature. In the context of the present invention, the term "immobilization" refers to both noncovalent association, such as adsorption, and covalent attachment

25   (which may be a direct linkage between the antigen and functional groups on the support or may be a linkage by way of a cross-linking agent). Immobilization by adsorption to a well in a microtiter plate or to a membrane is preferred. In such cases, adsorption may be achieved by contacting the antibody, in a suitable buffer, with the solid support for a suitable amount of time. The contact time varies with temperature, but is typically

30   between about 1 hour and 1 day. In general, contacting a well of a plastic microtiter plate (such as polystyrene or polyvinylchloride) with an amount of antibody ranging

from about 10 ng to about 1 µg, and preferably about 100-200 ng, is sufficient to immobilize an adequate amount of polypeptide.

Covalent attachment of antibody to a solid support may also generally be achieved by first reacting the support with a bifunctional reagent that will react with both the support and a functional group, such as a hydroxyl or amino group, on the antibody. For example, the antibody may be covalently attached to supports having an appropriate polymer coating using benzoquinone or by condensation of an aldehyde group on the support with an amine and an active hydrogen on the binding partner (*see, e.g.*, Pierce Immunotechnology Catalog and Handbook (1991) at A12-A13).

In certain embodiments, the assay for detection of polypeptide in a sample is a two-antibody sandwich assay. This assay may be performed by first contacting an antibody that has been immobilized on a solid support, commonly the well of a microtiter plate, with the biological sample, such that the polypeptide within the sample are allowed to bind to the immobilized antibody. Unbound sample is then removed from the immobilized polypeptide-antibody complexes and a second antibody (containing a reporter group) capable of binding to a different site on the polypeptide is added. The amount of second antibody that remains bound to the solid support is then determined using a method appropriate for the specific reporter group.

More specifically, once the antibody is immobilized on the support as described above, the remaining protein binding sites on the support are typically blocked. Any suitable blocking agent known to those of ordinary skill in the art, such as bovine serum albumin or Tween 20™ (Sigma Chemical Co., St. Louis, MO). The immobilized antibody is then incubated with the sample, and polypeptide is allowed to bind to the antibody. The sample may be diluted with a suitable diluent, such as phosphate-buffered saline (PBS) prior to incubation. In general, an appropriate contact time (*i.e.*, incubation time) is that period of time that is sufficient to detect the presence of polypeptide within a sample obtained from an individual with breast cancer. Preferably, the contact time is sufficient to achieve a level of binding that is at least 95% of that achieved at equilibrium between bound and unbound polypeptide. Those of ordinary skill in the art will recognize that the time necessary to achieve equilibrium may be readily determined by

assaying the level of binding that occurs over a period of time. At room temperature, an incubation time of about 30 minutes is generally sufficient.

Unbound sample may then be removed by washing the solid support with an appropriate buffer, such as PBS containing 0.1% Tween 20™. The second antibody, which contains a reporter group, may then be added to the solid support. Preferred reporter groups include enzymes (such as horseradish peroxidase), substrates, cofactors, inhibitors, dyes, radionuclides, luminescent groups, fluorescent groups and biotin. The conjugation of antibody to reporter group may be achieved using standard methods known to those of ordinary skill in the art.

The second antibody is then incubated with the immobilized antibody-polypeptide complex for an amount of time sufficient to detect the bound polypeptide. An appropriate amount of time may generally be determined by assaying the level of binding that occurs over a period of time. Unbound second antibody is then removed and bound second antibody is detected using the reporter group. The method employed for detecting the reporter group depends upon the nature of the reporter group. For radioactive groups, scintillation counting or autoradiographic methods are generally appropriate. Spectroscopic methods may be used to detect dyes, luminescent groups and fluorescent groups. Biotin may be detected using avidin, coupled to a different reporter group (commonly a radioactive or fluorescent group or an enzyme). Enzyme reporter groups may generally be detected by the addition of substrate (generally for a specific period of time), followed by spectroscopic or other analysis of the reaction products.

To determine the presence or absence of breast cancer, the signal detected from the reporter group that remains bound to the solid support is generally compared to a signal that corresponds to a predetermined cut-off value established from non-tumor tissue. In one preferred embodiment, the cut-off value is the average mean signal obtained when the immobilized antibody is incubated with samples from patients without breast cancer. In general, a sample generating a signal that is three standard deviations above the predetermined cut-off value may be considered positive for breast cancer. In an alternate preferred embodiment, the cut-off value is determined using a Receiver Operator Curve, according to the method of Sackett et al., *Clinical Epidemiology: A Basic Science for Clinical Medicine*, p. 106-7 (Little Brown and Co., 1985). Briefly, in

this embodiment, the cut-off value may be determined from a plot of pairs of true positive rates (*i.e.*, sensitivity) and false positive rates (100%-specificity) that correspond to each possible cut-off value for the diagnostic test result. The cut-off value on the plot that is the closest to the upper left-hand corner (*i.e.*, the value that encloses the largest

5 area) is the most accurate cut-off value, and a sample generating a signal that is higher than the cut-off value determined by this method may be considered positive. Alternatively, the cut-off value may be shifted to the left along the plot, to minimize the false positive rate, or to the right, to minimize the false negative rate. In general, a sample generating a signal that is higher than the cut-off value determined by this method is

10 considered positive for breast cancer.

In a related embodiment, the assay is performed in a flow-through or strip test format, wherein the antibody is immobilized on a membrane, such as nitrocellulose. In the flow-through test, the polypeptide within the sample bind to the immobilized antibody as the sample passes through the membrane. A second, labeled antibody then

15 binds to the antibody-polypeptide complex as a solution containing the second antibody flows through the membrane. The detection of bound second antibody may then be performed as described above. In the strip test format, one end of the membrane to which antibody is bound is immersed in a solution containing the sample. The sample migrates along the membrane through a region containing second antibody and to the

20 area of immobilized antibody. Concentration of second antibody at the area of immobilized antibody indicates the presence of breast cancer. Typically, the concentration of second antibody at that site generates a pattern, such as a line, that can be read visually. The absence of such a pattern indicates a negative result. In general, the amount of antibody immobilized on the membrane is selected to generate a visually

25 discernible pattern when the biological sample contains a level of polypeptide that would be sufficient to generate a positive signal in the two-antibody sandwich assay, in the format discussed above. Preferably, the amount of antibody immobilized on the membrane ranges from about 25 ng to about 1 µg, and more preferably from about 50 ng to about 1 µg. Such tests can typically be performed with a very small amount of

30 biological sample.

The presence or absence of breast cancer in a patient may also be determined by evaluating the level of mRNA encoding a breast tumor-specific polypeptide as described herein within the biological sample (*e.g.*, a biopsy, mastectomy and/or blood sample from a patient) relative to a predetermined cut-off value. Such an evaluation may be achieved using any of a variety of methods known to those of ordinary skill in the art such as, for example, *in situ* hybridization and amplification by polymerase chain reaction.

For example, polymerase chain reaction may be used to amplify sequences from cDNA prepared from RNA that is isolated from one of the above biological samples. Sequence-specific primers for use in such amplification may be designed based on the sequences provided in any one of SEQ ID NO: 1, 11-86, 142-298 301-303, 307, 313, 314, 316 and 317, and may be purchased or synthesized. In the case of B18Ag1, as noted herein, one suitable primer pair is B18Ag1-2 (5'ATG GCT ATT TTC GGG GGC TGA CA) (SEQ ID NO:126) and B18Ag1-3 (5'CCG GTA TCT CCT CGT GGG TAT T) (SEQ ID NO:127). The PCR reaction products may then be separated by gel electrophoresis and visualized according to methods well known to those of ordinary skill in the art. Amplification is typically performed on samples obtained from matched pairs of tissue (tumor and non-tumor tissue from the same individual) or from unmatched pairs of tissue (tumor and non-tumor tissue from different individuals). The amplification reaction is preferably performed on several dilutions of cDNA spanning two orders of magnitude. A two-fold or greater increase in expression in several dilutions of the tumor sample as compared to the same dilution of the non-tumor sample is considered positive.

As used herein, the term "primer/probe specific for a polynucleotide" means an oligonucleotide sequence that has at least about 80% identity, preferably at least about 90% and more preferably at least about 95%, identity to the polynucleotide in question, or an oligonucleotide sequence that is anti-sense to a sequence that has at least about 80% identity, preferably at least about 90% and more preferably at least about 95%, identity to the polynucleotide in question. Primers and/or probes which may be usefully employed in the inventive diagnostic methods preferably have at least about 10-40 nucleotides. In a preferred embodiment, the polymerase chain reaction primers

comprise at least about 10 contiguous nucleotides of a polynucleotide that encodes one of the polypeptides disclosed herein or that is anti-sense to a sequence that encodes one of the polypeptides disclosed herein. Preferably, oligonucleotide probes for use in the inventive diagnostic methods comprise at least about 15 contiguous oligonucleotides of a polynucleotide that encodes one of the polypeptides disclosed herein or that is anti-sense to a sequence that encodes one of the polypeptides disclosed herein. Techniques for both PCR based assays and *in situ* hybridization assays are well known in the art.

Conventional RT-PCR protocols using agarose and ethidium bromide staining, while important in defining gene specificity, do not lend themselves to diagnostic kit development because of the time and effort required in making them quantitative (i.e., construction of saturation and/or titration curves), and their sample throughput. This problem is overcome by the development of procedures such as real time RT-PCR which allows for assays to be performed in single tubes, and in turn can be modified for use in 96 well plate formats. Instrumentation to perform such methodologies are available from Perkin Elmer/Applied Biosystems Division. Alternatively, other high throughput assays using labeled probes (e.g., digoxygenin) in combination with labeled (e.g., enzyme fluorescent, radioactive) antibodies to such probes can also be used in the development of 96 well plate assays.

In yet another method for determining the presence or absence of breast cancer in a patient, one or more of the breast tumor-specific polypeptides described may be used in a skin test. As used herein, a "skin test" is any assay performed directly on a patient in which a delayed-type hypersensitivity (DTH) reaction (such as swelling, reddening or dermatitis) is measured following intradermal injection of one or more polypeptides as described above. Such injection may be achieved using any suitable device sufficient to contact the polypeptide or polypeptides with dermal cells of the patient, such as a tuberculin syringe or 1 mL syringe. Preferably, the reaction is measured at least 48 hours after injection, more preferably 48-72 hours.

The DTH reaction is a cell-mediated immune response, which is greater in patients that have been exposed previously to a test antigen (*i.e.*, an immunogenic portion of a polypeptide employed, or a variant thereof). The response may measured visually, using a ruler. In general, a response that is greater than about 0.5 cm in diameter,

preferably greater than about 5.0 cm in diameter, is a positive response, indicative of breast cancer.

The breast tumor-specific polypeptides described herein are preferably formulated, for use in a skin test, as pharmaceutical compositions containing at least one polypeptide and a physiologically acceptable carrier, such as water, saline, alcohol, or a buffer. Such compositions typically contain one or more of the above polypeptides in an amount ranging from about 1 µg to 100 µg, preferably from about 10 µg to 50 µg in a volume of 0.1 mL. Preferably, the carrier employed in such pharmaceutical compositions is a saline solution with appropriate preservatives, such as phenol and/or Tween 80™.

In other aspects of the present invention, the progression and/or response to treatment of a breast cancer may be monitored by performing any of the above assays over a period of time, and evaluating the change in the level of the response (*i.e.*, the amount of polypeptide or mRNA detected or, in the case of a skin test, the extent of the immune response detected). For example, the assays may be performed every month to every other month for a period of 1 to 2 years. In general, breast cancer is progressing in those patients in whom the level of the response increases over time. In contrast, breast cancer is not progressing when the signal detected either remains constant or decreases with time.

In further aspects of the present invention, the compounds described herein may be used for the immunotherapy of breast cancer. In these aspects, the compounds (which may be polypeptides, antibodies or polynucleotides) are preferably incorporated into pharmaceutical compositions or vaccines. Pharmaceutical compositions comprise one or more such compounds and a physiologically acceptable carrier. Vaccines may comprise one or more such compounds in combination with an immunostimulant, such as an adjuvant or a liposome (into which the compound is incorporated). An immunostimulant may be any substance that enhances or potentiates an immune response (antibody and/or cell-mediated) to an exogenous antigen. Examples of immunostimulants include adjuvants, biodegradable microspheres (*e.g.*, polylactic galactide) and liposomes (into which the compound is incorporated; *see e.g.*, Fullerton, U.S. Patent No. 4,235,877). Vaccine preparation is generally described in, for example,

M.F. Powell and M.J. Newman, eds., "Vaccine Design (the subunit and adjuvant approach)," Plenum Press (NY, 1995). Pharmaceutical compositions and vaccines within the scope of the present invention may also contain other compounds, which may be biologically active or inactive. For example, one or more immunogenic portions of

5 other tumor antigens may be present, either incorporated into a fusion polypeptide or as a separate compound, within the composition or vaccine.

   Alternatively, a vaccine may contain DNA encoding one or more of the polypeptides as described above, such that the polypeptide is generated *in situ*. In such vaccines, the DNA may be present within any of a variety of delivery systems known to

10 those of ordinary skill in the art, including nucleic acid expression systems, bacteria and viral expression systems. Appropriate nucleic acid expression systems contain the necessary DNA sequences for expression in the patient (such as a suitable promoter and terminating signal). Bacterial delivery systems involve the administration of a bacterium (such as *Bacillus-Calmette-Guerrin*) that expresses an immunogenic portion of the

15 polypeptide on its cell surface. In a preferred embodiment, the DNA may be introduced using a viral expression system (*e.g.*, vaccinia or other pox virus, retrovirus, or adenovirus), which may involve the use of a non-pathogenic (defective), replication competent virus. Techniques for incorporating DNA into such expression systems are well known to those of ordinary skill in the art. The DNA may also be "naked," as

20 described, for example, in Ulmer et al., *Science 259*:1745-1749 (1993), and reviewed by Cohen, *Science 259*:1691-1692 (1993). The uptake of naked DNA may be increased by coating the DNA onto biodegradable beads, which are efficiently transported into the cells.

   While any suitable carrier known to those of ordinary skill in the art may

25 be employed in the pharmaceutical compositions of this invention, the type of carrier will vary depending on the mode of administration. For parenteral administration, such as subcutaneous injection, the carrier preferably comprises water, saline, alcohol, a fat, a wax or a buffer. For oral administration, any of the above carriers or a solid carrier, such as mannitol, lactose, starch, magnesium stearate, sodium saccharine, talcum, cellulose,

30 glucose, sucrose, and magnesium carbonate, may be employed. Biodegradable

microspheres (*e.g.*, polylactate polyglycolate) may also be employed as carriers for the pharmaceutical compositions of this invention.

Any of a variety of immunostimulants may be employed in the vaccines of this invention. For example, an adjuvant may be included. Most adjuvants contain a substance designed to protect the antigen from rapid catabolism, such as aluminum hydroxide or mineral oil, and a stimulator of immune responses, such as lipid A, *Bortadella pertussis* or *Mycobacterium tuberculosis* derived proteins. Suitable adjuvants are commercially available as, for example, Freund's Incomplete Adjuvant and Complete Adjuvant (Difco Laboratories, Detroit, MI); Merck Adjuvant 65 (Merck and Company, Inc., Rahway, NJ); AS-2 (SmithKline Beecham, Philadelphia, PA); aluminum salts such as aluminum hydroxide gel (alum) or aluminum phosphate; salts of calcium, iron or zinc; an insoluble suspension of acylated tyrosine; acylated sugars; cationically or anionically derivatized polysaccharides; polyphosphazenes; biodegradable microspheres; monophosphoryl lipid A and quil A. Cytokines, such as GM-CSF or interleukin-2, -7, or -12, may also be used as adjuvants.

Within the vaccines provided herein, the adjuvant composition is preferably designed to induce an immune response predominantly of the Th1 type. High levels of Th1-type cytokines (*e.g.*, IFN-γ, TNFα, IL-2 and IL-12) tend to favor the induction of cell mediated immune responses to an administered antigen. In contrast, high levels of Th2-type cytokines (*e.g.*, IL-4, IL-5, IL-6 and IL-10) tend to favor the induction of humoral immune responses. Following application of a vaccine as provided herein, a patient will support an immune response that includes Th1- and Th2-type responses. Within a preferred embodiment, in which a response is predominantly Th1-type, the level of Th1-type cytokines will increase to a greater extent than the level of Th2-type cytokines. The levels of these cytokines may be readily assessed using standard assays. For a review of the families of cytokines, see Mosmann and Coffman, *Ann. Rev. Immunol.* 7:145-173, 1989.

Preferred adjuvants for use in eliciting a predominantly Th1-type response include, for example, a combination of monophosphoryl lipid A, preferably 3-de-O-acylated monophosphoryl lipid A (3D-MPL), together with an aluminum salt. MPL adjuvants are available from Corixa Corporation (Seattle, WA; *see* US Patent Nos.

4,436,727; 4,877,611; 4,866,034 and 4,912,094). CpG-containing oligonucleotides (in which the CpG dinucleotide is unmethylated) also induce a predominantly Th1 response. Such oligonucleotides are well known and are described, for example, in WO 96/02555 and WO 99/33488. Immunostimulatory DNA sequences are also described, for example,

5   by Sato et al., *Science 273*:352, 1996. Another preferred adjuvant is a saponin, preferably QS21 (Aquila Biopharmaceuticals Inc., Framingham, MA), which may be used alone or in combination with other adjuvants. For example, an enhanced system involves the combination of a monophosphoryl lipid A and saponin derivative, such as the combination of QS21 and 3D-MPL as described in WO 94/00153, or a less

10   reactogenic composition where the QS21 is quenched with cholesterol, as described in WO 96/33739. Other preferred formulations comprise an oil-in-water emulsion and tocopherol. A particularly potent adjuvant formulation involving QS21, 3D-MPL and tocopherol in an oil-in-water emulsion is described in WO 95/17210.

Other preferred adjuvants include Montanide ISA 720 (Seppic, France),

15   SAF (Chiron, California, United States), ISCOMS (CSL), MF-59 (Chiron), the SBAS series of adjuvants (*e.g.,* SBAS-2 or SBAS-4, available from SmithKline Beecham, Rixensart, Belgium), Detox (Ribi ImmunoChem Research Inc., Hamilton, MT), RC-529 (Ribi ImmunoChem Research Inc., Hamilton, MT) and Aminoalkyl glucosaminide 4-phosphates (AGPs).

20   Any vaccine provided herein may be prepared using well known methods that result in a combination of antigen, immunostimulant and a suitable carrier or excipient. The compositions described herein may be administered as part of a sustained release formulation (*i.e.,* a formulation such as a capsule, sponge or gel (composed of polysaccharides, for example) that effects a slow release of compound following

25   administration). Such formulations may generally be prepared using well known technology (*see, e.g.,* Coombes et al., *Vaccine 14*:1429-1438, 1996) and administered by, for example, oral, rectal or subcutaneous implantation, or by implantation at the desired target site. Sustained-release formulations may contain a polypeptide, polynucleotide or antibody dispersed in a carrier matrix and/or contained within a reservoir surrounded by

30   a rate controlling membrane.

Carriers for use within such formulations are biocompatible, and may also

be biodegradable; preferably the formulation provides a relatively constant level of active component release. Such carriers include microparticles of poly(lactide-co-glycolide), as well as polyacrylate, latex, starch, cellulose and dextran. Other delayed-release carriers include supramolecular biovectors, which comprise a non-liquid hydrophilic core (*e.g.,* a cross-linked polysaccharide or oligosaccharide) and, optionally, an external layer comprising an amphiphilic compound, such as a phospholipid (*see e.g.,* U.S. Patent No. 5,151,254 and PCT applications WO 94/20078, WO/94/23701 and WO 96/06638). The amount of active compound contained within a sustained release formulation depends upon the site of implantation, the rate and expected duration of release and the nature of the condition to be treated or prevented.

Any of a variety of delivery vehicles may be employed within pharmaceutical compositions and vaccines to facilitate production of an antigen-specific immune response that targets tumor cells. Delivery vehicles include antigen presenting cells (APCs), such as dendritic cells, macrophages, B cells, monocytes and other cells that may be engineered to be efficient APCs. Such cells may, but need not, be genetically modified to increase the capacity for presenting the antigen, to improve activation and/or maintenance of the T cell response, to have anti-tumor effects *per se* and/or to be immunologically compatible with the receiver (*i.e.,* matched HLA haplotype). APCs may generally be isolated from any of a variety of biological fluids and organs, including tumor and peritumoral tissues, and may be autologous, allogeneic, syngeneic or xenogeneic cells.

Certain preferred embodiments of the present invention use dendritic cells or progenitors thereof as antigen-presenting cells. Dendritic cells are highly potent APCs (Banchereau and Steinman, *Nature 392*:245-251, 1998) and have been shown to be effective as a physiological adjuvant for eliciting prophylactic or therapeutic antitumor immunity (*see* Timmerman and Levy, *Ann. Rev. Med. 50*:507-529, 1999). In general, dendritic cells may be identified based on their typical shape (stellate *in situ,* with marked cytoplasmic processes (dendrites) visible *in vitro*), their ability to take up, process and present antigens with high efficiency and their ability to activate naïve T cell responses. Dendritic cells may, of course, be engineered to express specific cell-surface receptors or ligands that are not commonly found on dendritic cells *in vivo* or *ex vivo,*

and such modified dendritic cells are contemplated by the present invention. As an alternative to dendritic cells, secreted vesicles antigen-loaded dendritic cells (called exosomes) may be used within a vaccine (*see* Zitvogel et al., *Nature Med. 4*:594-600, 1998).

5   Dendritic cells and progenitors may be obtained from peripheral blood, bone marrow, tumor-infiltrating cells, peritumoral tissues-infiltrating cells, lymph nodes, spleen, skin, umbilical cord blood or any other suitable tissue or fluid. For example, dendritic cells may be differentiated *ex vivo* by adding a combination of cytokines such as GM-CSF, IL-4, IL-13 and/or TNFα to cultures of monocytes harvested from

10 peripheral blood. Alternatively, CD34 positive cells harvested from peripheral blood, umbilical cord blood or bone marrow may be differentiated into dendritic cells by adding to the culture medium combinations of GM-CSF, IL-3, TNFα, CD40 ligand, LPS, flt3 ligand and/or other compound(s) that induce differentiation, maturation and proliferation of dendritic cells.

15   Dendritic cells are conveniently categorized as "immature" and "mature" cells, which allows a simple way to discriminate between two well characterized phenotypes. However, this nomenclature should not be construed to exclude all possible intermediate stages of differentiation. Immature dendritic cells are characterized as APC with a high capacity for antigen uptake and processing, which correlates with the high

20 expression of Fcγ receptor and mannose receptor. The mature phenotype is typically characterized by a lower expression of these markers, but a high expression of cell surface molecules responsible for T cell activation such as class I and class II MHC, adhesion molecules (*e.g.,* CD54 and CD11) and costimulatory molecules (*e.g.,* CD40, CD80, CD86 and 4-1BB).

25   APCs may generally be transfected with a polynucleotide encoding a polypeptide of the present invention (or portion or other variant thereof) such that the polypeptide, or an immunogenic portion thereof, is expressed on the cell surface. Such transfection may take place *ex vivo*, and a composition or vaccine comprising such transfected cells may then be used for therapeutic purposes, as described herein.

30 Alternatively, a gene delivery vehicle that targets a dendritic or other antigen presenting cell may be administered to a patient, resulting in transfection that occurs *in vivo*. *In vivo*

and *ex vivo* transfection of dendritic cells, for example, may generally be performed using any methods known in the art, such as those described in WO 97/24447, or the gene gun approach described by Mahvi et al., *Immunology and cell Biology 75*:456-460, 1997. Antigen loading of dendritic cells may be achieved by incubating dendritic cells or progenitor cells with the polypeptide, DNA (naked or within a plasmid vector) or RNA; or with antigen-expressing recombinant bacterium or viruses (*e.g.*, vaccinia, fowlpox, adenovirus or lentivirus vectors). Prior to loading, the polypeptide may be covalently conjugated to an immunological partner that provides T cell help (*e.g.*, a carrier molecule). Alternatively, a dendritic cell may be pulsed with a non-conjugated immunological partner, separately or in the presence of the polypeptide.

Vaccines and pharmaceutical compositions may be presented in unit-dose or multi-dose containers, such as sealed ampoules or vials. Such containers are preferably hermetically sealed to preserve sterility of the formulation until use. In general, formulations may be stored as suspensions, solutions or emulsions in oily or aqueous vehicles. Alternatively, a vaccine or pharmaceutical composition may be stored in a freeze-dried condition requiring only the addition of a sterile liquid carrier immediately prior to use.

The above pharmaceutical compositions and vaccines may be used, for example, for the therapy of breast cancer in a patient. As used herein, a "patient" refers to any warm-blooded animal, preferably a human. A patient may or may not be afflicted with breast cancer. Accordingly, the above pharmaceutical compositions and vaccines may be used to prevent the development of breast cancer or to treat a patient afflicted with breast cancer. In a preferred embodiment, the compounds are administered either prior to or following surgical removal of primary tumors and/or treatment by administration of radiotherapy and conventional chemotherapeutic drugs. To prevent or slow the development of breast cancer, a pharmaceutical composition or vaccine comprising one or more polypeptides as described herein may be administered to a patient. Alternatively, naked DNA or plasmid or viral vector encoding the polypeptide may be administered. For treating a patient with breast cancer, the pharmaceutical composition or vaccine may comprise one or more polypeptides, antibodies or

polynucleotides complementary to DNA encoding a polypeptide as described herein (*e.g.*, antisense RNA or antisense deoxyribonucleotide oligonucleotides).

Routes and frequency of administration, as well as dosage, will vary from individual to individual. In general, the pharmaceutical compositions and vaccines may be administered by injection (*e.g.*, intracutaneous, intramuscular, intravenous or subcutaneous), intranasally (*e.g.*, by aspiration) or orally. Between 1 and 10 doses may be administered for a 52-week period. Preferably, 6 doses are administered, at intervals of 1 month, and booster vaccinations may be given periodically thereafter. Alternate protocols may be appropriate for individual patients. A suitable dose is an amount of a compound that, when administered as described above, is capable of promoting an anti-tumor immune response. Such response can be monitored by measuring the anti-tumor antibodies in a patient or by vaccine-dependent generation of cytolytic effector cells capable of killing the patient's tumor cells *in vitro*. Such vaccines should also be capable of causing an immune response that leads to an improved clinical outcome (*e.g.*, more frequent remissions, complete or partial or longer disease-free survival) in vaccinated patients as compared to non-vaccinated patients. In general, for pharmaceutical compositions and vaccines comprising one or more polypeptides, the amount of each polypeptide present in a dose ranges from about 100 µg to 5 mg. Suitable dose sizes will vary with the size of the patient, but will typically range from about 0.1 mL to about 5 mL.

Polypeptides disclosed herein may also be employed in adoptive immunotherapy for the treatment of cancer. Adoptive immunotherapy may be broadly classified into either active or passive immunotherapy. In active immunotherapy, treatment relies on the *in vivo* stimulation of the endogenous host immune system to react against tumors with the administration of immune response-modifying agents (for example, tumor vaccines, bacterial adjuvants, and/or cytokines).

In passive immunotherapy, treatment involves the delivery of biologic reagents with established tumor-immune reactivity (such as effector cells or antibodies) that can directly or indirectly mediate antitumor effects and does not necessarily depend on an intact host immune system. Examples of effector cells include T lymphocytes (for example, CD8+ cytotoxic T-lymphocyte, CD4+ T-helper, tumor-infiltrating lymphocytes), killer cells (Natural Killer cells, lymphokine-activated killer cells), B

cells, or antigen presenting cells (such as dendritic cells and macrophages) expressing the disclosed antigens. The polypeptides disclosed herein may also be used to generate antibodies or anti-idiotypic antibodies (as in U.S. Patent No. 4,918,164), for passive immunotherapy.

The predominant method of procuring adequate numbers of T-cells for adoptive immunotherapy is to grow immune T-cells *in vitro*. Culture conditions for expanding single antigen-specific T-cells to several billion in number with retention of antigen recognition *in vivo* are well known in the art. These *in vitro* culture conditions typically utilize intermittent stimulation with antigen, often in the presence of cytokines, such as IL-2, and non-dividing feeder cells. As noted above, the immunoreactive polypeptides described herein may be used to rapidly expand antigen-specific T cell cultures in order to generate sufficient number of cells for immunotherapy. In particular, antigen-presenting cells, such as dendritic, macrophage or B-cells, may be pulsed with immunoreactive polypeptides or transfected with a polynucleotide sequence(s), using standard techniques well known in the art. For cultured T-cells to be effective in therapy, the cultured T-cells must be able to grow and distribute widely and to survive long term *in vivo*. Studies have demonstrated that cultured T-cells can be induced to grow *in vivo* and to survive long term in substantial numbers by repeated stimulation with antigen supplemented with IL-2 (see, for example, Cheever et al. *Ibid*).

The polypeptides disclosed herein may also be employed to generate and/or isolate tumor-reactive T-cells, which can then be administered to the patient. In one technique, antigen-specific T-cell lines may be generated by *in vivo* immunization with short peptides corresponding to immunogenic portions of the disclosed polypeptides. The resulting antigen specific CD8+ CTL clones may be isolated from the patient, expanded using standard tissue culture techniques, and returned to the patient.

Alternatively, peptides corresponding to immunogenic portions of the polypeptides may be employed to generate tumor reactive T cell subsets by selective *in vitro* stimulation and expansion of autologous T cells to provide antigen-specific T cells which may be subsequently transferred to the patient as described, for example, by Chang et al. *(Crit. Rev. Oncol. Hematol., 22*(3), 213, 1996).

In another embodiment, syngeneic or autologous dendritic cells may be pulsed with peptides corresponding to at least an immunogenic portion of a polypeptide

disclosed herein. The resulting antigen-specific dendritic cells may either be transferred into a patient, or employed to stimulate T cells to provide antigen-specific T cells which may, in turn, be administered to a patient. The use of peptide-pulsed dendritic cells to generate antigen-specific T cells and the subsequent use of such antigen-specific T cells to eradicate tumors in a murine model has been demonstrated by Cheever et al. ("Therapy With Cultured T Cells: Principles Revisited," *Immunological Reviews,* *157*:177, 1997).

Additionally vectors expressing the disclosed polynucleotides may be introduced into stem cells taken from the patient and clonally propagated *in vitro* for autologous transplant back into the same patient. In one embodiment, cells of the immune system, such as T cells, may be isolated from the peripheral blood of a patient, using a commercially available cell separation system, such as CellPro Incorporated's (Bothell, WA) CEPRATE™ system (see U.S. Patent No. 5,240,856; U.S. Patent No. 5,215,926; WO 89/06280; WO 91/16116 and WO 92/07243). The separated cells are stimulated with one or more of the immunoreactive polypeptides contained within a delivery vehicle, such as a microsphere, to provide antigen-specific T cells. The population of tumor antigen-specific T cells is then expanded using standard techniques and the cells are administered back to the patient.

The following Examples are offered by way of illustration and not by way of limitation.

<u>EXAMPLES</u>

EXAMPLE 1

PREPARATION OF BREAST TUMOR-SPECIFIC CDNAS USING
DIFFERENTIAL DISPLAY RT-PCR

This Example illustrates the preparation of cDNA molecules encoding breast tumor-specific polypeptides using a differential display screen.

A.   Preparation of B18Ag1 cDNA and Characterization of mRNA Expression

Tissue samples were prepared from breast tumor and normal tissue of a patient with breast cancer that was confirmed by pathology after removal from the patient. Normal RNA and tumor RNA was extracted from the samples and mRNA was

5   isolated and converted into cDNA using a $(dT)_{12}AG$ (SEQ ID NO:130) anchored 3' primer. Differential display PCR was then executed using a randomly chosen primer (CTTCAACCTC) (SEQ ID NO:103). Amplification conditions were standard buffer containing 1.5 mM $MgCl_2$, 20 pmol of primer, 500 pmol dNTP, and 1 unit of *Taq* DNA polymerase (Perkin-Elmer, Branchburg, NJ). Forty cycles of amplification were

10   performed using 94°C denaturation for 30 seconds, 42°C annealing for 1 minute, and 72° C extension for 30 seconds. An RNA fingerprint containing 76 amplified products was obtained. Although the RNA fingerprint of breast tumor tissue was over 98% identical to that of the normal breast tissue, a band was repeatedly observed to be specific to the RNA fingerprint pattern of the tumor. This band was cut out of a silver stained gel,

15   subcloned into the T-vector (Novagen, Madison, WI) and sequenced.

The sequence of the cDNA, referred to as B18Ag1, is provided in SEQ ID NO:1. A database search of GENBANK and EMBL revealed that the B18Ag1 fragment initially cloned is 77% identical to the endogenous human retroviral element S71, which is a truncated retroviral element homologous to the Simian Sarcoma Virus (SSV). S71

20   contains an incomplete *gag* gene, a portion of the *pol* gene and an LTR-like structure at the 3' terminus (*see* Werner et al., *Virology 174*:225-238 (1990)). B18Ag1 is also 64% identical to SSV in the region corresponding to the P30 (gag) locus. B18Ag1 contains three separate and incomplete reading frames covering a region which shares considerable homology to a wide variety of gag proteins of retroviruses which infect

25   mammals. In addition, the homology to S71 is not just within the *gag* gene, but spans several kb of sequence including an LTR.

B18Ag1-specific PCR primers were synthesized using computer analysis guidelines. RT-PCR amplification (94°C, 30 seconds; 60°C → 42°C, 30 seconds; 72°C, 30 seconds for 40 cycles) confirmed that B18Ag1 represents an actual mRNA sequence

30   present at relatively high levels in the patient's breast tumor tissue. The primers used in amplification were B18Ag1-1 (CTG CCT GAG CCA CAA ATG) (SEQ ID NO:128) and

B18Ag1-4 (CCG GAG GAG GAA GCT AGA GGA ATA) (SEQ ID NO:129) at a 3.5 mM magnesium concentration and a pH of 8.5, and B18Ag1-2 (ATG GCT ATT TTC GGG GCC TGA CA) (SEQ ID NO:126) and B18Ag1-3 (CCG GTA TCT CCT CGT GGG TAT T) (SEQ ID NO:127) at 2 mM magnesium at pH 9.5. The same experiments showed exceedingly low to nonexistent levels of expression in this patient's normal breast tissue (*see* Figure 1). RT-PCR experiments were then used to show that B18Ag1 mRNA is present in nine other breast tumor samples (from Brazilian and American patients) but absent in, or at exceedingly low levels in, the normal breast tissue corresponding to each cancer patient. RT-PCR analysis has also shown that the B18Ag1 transcript is not present in various normal tissues (including lymph node, myocardium and liver) and present at relatively low levels in PBMC and lung tissue. The presence of B18Ag1 mRNA in breast tumor samples, and its absence from normal breast tissue, has been confirmed by Northern blot analysis, as shown in Figure 2.

The differential expression of B18Ag1 in breast tumor tissue was also confirmed by RNase protection assays. Figure 3 shows the level of B18Ag1 mRNA in various tissue types as determined in four different RNase protection assays. Lanes 1-12 represent various normal breast tissue samples, lanes 13-25 represent various breast tumor samples; lanes 26-27 represent normal prostate samples; lanes 28-29 represent prostate tumor samples; lanes 30-32 represent colon tumor samples; lane 33 represents normal aorta; lane 34 represents normal small intestine; lane 35 represents normal skin, lane 36 represents normal lymph node; lane 37 represents normal ovary; lane 38 represents normal liver; lane 39 represents normal skeletal muscle; lane 40 represents a first normal stomach sample, lane 41 represents a second normal stomach sample; lane 42 represents a normal lung; lane 43 represents normal kidney; and lane 44 represents normal pancreas. Interexperimental comparison was facilitated by including a positive control RNA of known β-actin message abundance in each assay and normalizing the results of the different assays with respect to this positive control.

RT-PCR and Southern Blot analysis has shown the B18Ag1 locus to be present in human genomic DNA as a single copy endogenous retroviral element. A genomic clone of approximately 12-18 kb was isolated using the initial B18Ag1 sequence as a probe. Four additional subclones were also isolated by XbaI digestion.

Additional retroviral sequences obtained from the ends of the XbaI digests of these clones (located as shown in Figure 4) are shown as SEQ ID NO:3 - SEQ ID NO:10, where SEQ ID NO:3 shows the location of the sequence labeled 10 in Figure 4, SEQ ID NO:4 shows the location of the sequence labeled 11-29, SEQ ID NO:5 shows the location of the sequence labeled 3, SEQ ID NO:6 shows the location of the sequence labeled 6, SEQ ID NO:7 shows the location of the sequence labeled 12, SEQ ID NO:8 shows the location of the sequence labeled 13, SEQ ID NO:9 shows the location of the sequence labeled 14 and SEQ ID NO:10 shows the location of the sequence labeled 11-22.

Subsequent studies demonstrated that the 12-18 kb genomic clone contains a retroviral element of about 7.75 kb, as shown in Figures 5A and 5B. The sequence of this retroviral element is shown in SEQ ID NO: 141. The numbered line at the top of Figure 5A represents the sense strand sequence of the retroviral genomic clone. The box below this line shows the position of selected restriction sites. The arrows depict the different overlapping clones used to sequence the retroviral element. The direction of the arrow shows whether the single-pass subclone sequence corresponded to the sense or anti-sense strand. Figure 5B is a schematic diagram of the retroviral element containing B18Ag1 depicting the organization of viral genes within the element. The open boxes correspond to predicted reading frames, starting with a methionine, found throughout the element. Each of the six likely reading frames is shown, as indicated to the left of the boxes, with frames 1-3 corresponding to those found on the sense strand.

Using the cDNA of SEQ ID NO:1 as a probe, a longer cDNA was obtained (SEQ ID NO:227) which contains minor nucleotide differences (less than 1%) compared to the genomic sequence shown in SEQ ID NO:141.

B.   Preparation of cDNA Molecules Encoding Other Breast Tumor-Specific Polypeptides

Normal RNA and tumor RNA was prepared and mRNA was isolated and converted into cDNA using a (dT)$_{12}$AG anchored 3' primer, as described above. Differential display PCR was then executed using the randomly chosen primers of SEQ ID NO: 87-125. Amplification conditions were as noted above, and bands observed to be specific to the RNA fingerprint pattern of the tumor were cut out of a silver stained

gel, subcloned into either the T-vector (Novagen, Madison, WI) or the pCRII vector (Invitrogen, San Diego, CA) and sequenced. The sequences are provided in SEQ ID NO:11 - SEQ ID NO:86. Of the 79 sequences isolated, 67 were found to be novel (SEQ ID NO:11-26 and 28-77) (see also Figures 6-20).

5   An extended DNA sequence (SEQ ID NO: 290) for the antigen B15Ag1 (originally identified partial sequence provided in SEQ ID NO: 27) was obtained in further studies. Comparison of the sequence of SEQ ID NO: 290 with those in the gene bank as described above, revealed homology to the known human β-A activin gene. Further studies led to the isolation of the full-length cDNA sequence for the antigen

10   B21GT2 (also referred to as B311D; originally identified partial cDNA sequence provided in SEQ ID NO: 56). The full-length sequence is provided in SEQ ID NO: 307, with the corresponding amino acid sequence being provided in SEQ ID NO: 308. Further studies led to the isolation of a splice variant of B311D. The B311D clone of SEQ ID NO: 316 was sequenced and a XhoI/NotI fragment from this clone was gel

15   purified and 32P-cDTP labeled by random priming for use as a probe for further screening to obtain additional B311D gene sequence. Two fractions of a human breast tumor cDNA bacterial library were screened using standard techniques. One of the clones isolated in this manner yielded additional sequence which includes a poly A+ tail. The determined cDNA sequence of this clone (referred to as B311D_BT1_1A) is

20   provided in SEQ ID NO: 317. The sequences of SEQ ID NO: 316 and 317 were found to share identity over a 464 bp region, with the sequences diverging near the poly A+ sequence of SEQ ID NO: 317.

      Subsequent studies identified an additional 146 sequences (SEQ ID NOS:142-289), of which 115 appeared to be novel (SEQ ID NOS:142, 143, 146-152,

25   154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-240, 243-245, 247, 250, 251, 253, 255, 257-266, 268, 269, 271-273, 275, 276, 278, 280, 281, 284, 288 and 291). To the best of the inventors' knowledge none of the previously identified sequences have heretofore been shown to be expressed at a greater level in human breast tumor tissue than in normal breast tissue.

30   In further studies, several different splice forms of the antigen B11Ag1 (also referred to as B305D) were isolated, with each of the various splice forms

containing slightly different versions of the B11Ag1 coding frame. Splice junction sequences define individual exons which, in various patterns and arrangements, make up the various splice forms. Primers were designed to examine the expression pattern of each of the exons using RT-PCR as described below. Each exon was found to show the same expression pattern as the original B11Ag1 clone, with expression being breast tumor-, normal prostate- and normal testis-specific. The determined cDNA sequences for the isolated protein coding exons are provided in SEQ ID NO: 292-298, respectively. The predicted amino acid sequences corresponding to the sequences of SEQ ID NO: 292 and 298 are provided in SEQ ID NO: 299 and 300. Additional studies using rapid amplification of cDNA ends (RACE), a 5' specific primer to one of the splice forms of B11Ag1 provided above and a breast adenocarcinoma, led to the isolation of three additional, related, splice forms referred to as isoforms B11C-15, B11C-8 and B11C-9,16. The determined cDNA sequences for these isoforms are provided in SEQ ID NO: 301-303, with the corresponding predicted amino acid sequences being provided in SEQ ID NO: 304-306.

In subsequent studies on B305D isoform A (cDNA sequence provided in SEQ ID NO: 292), the cDNA sequence (provided in SEQ ID NO: 313) was found to contain an additional guanine residue at position 884, leading to a frameshift in the open reading frame. The determined DNA sequence of this ORF is provided in SEQ ID NO: 314. This frameshift generates a protein sequence (provided in SEQ ID NO: 315) of 293 amino acids that contains the C-terminal domain common to the other isoforms of B305D but that differs in the N-terminal region.

EXAMPLE 2

PREPARATION OF B18AG1 DNA FROM HUMAN GENOMIC DNA

This Example illustrates the preparation of B18Ag1 DNA by amplification from human genomic DNA.

B18Ag1 DNA may be prepared from 250 ng human genomic DNA using 20 pmol of B18Ag1 specific primers, 500 pmol dNTPS and 1 unit of *Taq* DNA polymerase (Perkin Elmer, Branchburg, NJ) using the following amplification

parameters: 94°C for 30 seconds denaturing, 30 seconds 60°C to 42°C touchdown annealing in 2°C increments every two cycles and 72°C extension for 30 seconds. The last increment (a 42°C annealing temperature) should cycle 25 times. Primers were selected using computer analysis. Primers synthesized were B18Ag1-1, B18Ag1-2, B18Ag1-3, and B18Ag1-4. Primer pairs that may be used are 1+3, 1+4, 2+3, and 2+4.

Following gel electrophoresis, the band corresponding to B18Ag1 DNA may be excised and cloned into a suitable vector.

EXAMPLE 3

PREPARATION OF B18AG1 DNA FROM BREAST TUMOR CDNA

This Example illustrates the preparation of B18Ag1 DNA by amplification from human breast tumor cDNA.

First strand cDNA is synthesized from RNA prepared from human breast tumor tissue in a reaction mixture containing 500 ng poly A+ RNA, 200 pmol of the primer $(T)_{12}AG$ (i.e., TTT TTT TTT TTT AG) (SEQ ID NO: 130), 1X first strand reverse transcriptase buffer, 6.7 mM DTT, 500 mmol dNTPs, and 1 unit AMV or MMLV reverse transcriptase (from any supplier, such as Gibco-BRL (Grand Island, NY)) in a final volume of 30 µl. After first strand synthesis, the cDNA is diluted approximately 25 fold and 1 µl is used for amplification as described in Example 2. While some primer pairs can result in a heterogeneous population of transcripts, the primers B18Ag1-2 (5'ATG GCT ATT TTC GGG GGC TGA CA) (SEQ ID NO: 126) and B18Ag1-3 (5'CCG GTA TCT CCT CGT GGG TAT T) (SEQ ID NO: 127) yield a single 151 bp amplification product.

EXAMPLE 4

IDENTIFICATION OF B-CELL AND T-CELL EPITOPES OF B18AG1

This Example illustrates the identification of B18Ag1 epitopes.

The B18Ag1 sequence can be screened using a variety of computer algorithms. To determine B-cell epitopes, the sequence can be screened for

hydrophobicity and hydrophilicity values using the method of Hopp, *Prog. Clin. Biol. Res. 172B*:367-77 (1985) or, alternatively, Cease et al., *J. Exp. Med. 164*:1779-84 (1986) or Spouge et al., *J. Immunol. 138*:204-12 (1987). Additional Class II MHC (antibody or B-cell) epitopes can be predicted using programs such as AMPHI (*e.g.*, Margalit et al., *J. Immunol. 138*:2213 (1987)) or the methods of Rothbard and Taylor (*e.g.*, *EMBO J. 7*:93 (1988)).

Once peptides (15-20 amino acids long) are identified using these techniques, individual peptides can be synthesized using automated peptide synthesis equipment (available from manufacturers such as Perkin Elmer/Applied Biosystems Division, Foster City, CA) and techniques such as Merrifield synthesis. Following synthesis, the peptides can used to screen sera harvested from either normal or breast cancer patients to determine whether patients with breast cancer possess antibodies reactive with the peptides. Presence of such antibodies in breast cancer patient would confirm the immunogenicity of the specific B-cell epitope in question. The peptides can also be tested for their ability to generate a serologic or humoral immune in animals (mice, rats, rabbits, chimps etc.) following immunization *in vivo*. Generation of a peptide-specific antiserum following such immunization further confirms the immunogenicity of the specific B-cell epitope in question.

To identify T-cell epitopes, the B18Ag1 sequence can be screened using different computer algorithms which are useful in identifying 8-10 amino acid motifs within the B18Ag1 sequence which are capable of binding to HLA Class I MHC molecules. (*see, e.g.*, Rammensee et al., *Immunogenetics 41*:178-228 (1995)). Following synthesis such peptides can be tested for their ability to bind to class I MHC using standard binding assays (*e.g.*, Sette et al., *J. Immunol. 153*:5586-92 (1994)) and more importantly can be tested for their ability to generate antigen reactive cytotoxic T-cells following *in vitro* stimulation of patient or normal peripheral mononuclear cells using, for example, the methods of Bakker et al., *Cancer Res. 55*:5330-34 (1995); Visseren et al., *J. Immunol. 154*:3991-98 (1995); Kawakami et al., *J. Immunol. 154*:3961-68 (1995); and Kast et al., *J. Immunol. 152*:3904-12 (1994). Successful *in vitro* generation of T-cells capable of killing autologous (bearing the same Class I MHC molecules) tumor cells following *in vitro* peptide stimulation further confirms the immunogenicity of the

B18Ag1 antigen. Furthermore, such peptides may be used to generate murine peptide and B18Ag1 reactive cytotoxic T-cells following *in vivo* immunization in mice rendered transgenic for expression of a particular human MHC Class I haplotype (Vitiello et al., *J. Exp. Med. 173*:1007-15 (1991).

5   A representative list of predicted B18Ag1 B-cell and T-cell epitopes, broken down according to predicted HLA Class I MHC binding antigen, is shown below:

Predicted Th Motifs (B-cell epitopes) (SEQ ID NOS.: 131-133)

SSGGRTFDDFHRYLLVGI

10   QGAAQKPINLSKXIEVVQGHDE

SPGVFLEHLQEAYRIYTPFDLSA

Predicted HLA A2.1 Motifs (T-cell epitopes) (SEQ ID NOS.: 134-140)

YLLVGIQGA

15   GAAQKPINL

NLSKXIEVV

EVVQGHDES

HLQEAYRIY

NLAFVAQAA

20   FVAQAAPDS

EXAMPLE 5

IDENTIFICATION OF T-CELL EPITOPES OF B11AG1

This Example illustrates the identification of B11Ag1 (also referred to as B305D) epitopes. Four peptides, referred to as B11-8, B11-1, B11-5 and B11-12 (SEQ ID NO: 309-312, respectfully) were derived from the B11Ag1 gene.

Human CD8 T cells were primed *in vitro* to the peptide B11-8 using dendritic cells according to the protocol of Van Tsai et al. (*Critical Reviews in Immunology 18*:65-75, 1998). The resulting CD8 T cell cultures were tested for their ability to recognize the B11-8 peptide or a negative control peptide, presented by the B-LCL line, JY. Briefly, T cells were incubated with autologous monocytes in the presence

of 10 ug/ml peptide, 10 ng/ml IL-7 and 10 ug/ml IL-2, and assayed for their ability to specifically lyse target cells in a standard 51-Cr release assay. As shown in Fig. 22, the bulk culture line demonstrated strong recognition of the B11-8 peptide with weaker recognition of the peptide B11-1.

A clone from this CTL line was isolated following rapid expansion using the monoclonal antibody OKT3 and human IL-2. As shown in Fig. 23, this clone (referred to as A1), in addition to being able to recognize specific peptide, recognized JY LCL transduced with the B11Ag1 gene. This data demonstrates that B11-8 is a naturally processed epitope of the B11Ag1 gene. In addition these T cells were further found to recognize and lyse, in an HLA-A2 restricted manner, an established tumor cell line naturally expressing B11Ag1 (Fig. 24). The T cells strongly recognize a lung adenocarcinoma (LT-140-22) naturally expressing B11Ag1 transduced with HLA-A2, as well as an A2+ breast carcinoma (CAMA-1) transduced with B11Ag1, but not untransduced lines or another negative tumor line (SW620).

These data clearly demonstrate that these human T cells recognize not only B11-specific peptides but also transduced cells, as well as naturally expressing tumor lines.

CTL lines raised against the antigens B11-5 and B11-12, using the procedures described above, were found to recognize corresponding peptide-coated targets.

Example 6

CHARACTERIZATION OF BREAST TUMOR GENES DISCOVERED BY

DIFFERENTIAL DISPLAY PCR

5   The specificity and sensitivity of the breast tumor genes discovered by differential display PCR were determined using RT-PCR. This procedure enabled the rapid evaluation of breast tumor gene mRNA expression semiquantitatively without using large amounts of RNA. Using gene specific primers, mRNA expression levels in a variety of tissues were examined, including 8 breast tumors, 5 normal breasts, 2 prostate

10   tumors, 2 colon tumors, 1 lung tumor, and 14 other normal adult human tissues, including normal prostate, colon, kidney, liver, lung, ovary, pancreas, skeletal muscle, skin, stomach and testes.

To ensure the semiquantitative nature of the RT-PCR, β-actin was used as internal control for each of the tissues examined. Serial dilutions of the first strand

15   cDNAs were prepared and RT-PCR assays performed using β-actin specific primers. A dilution was then selected that enabled the linear range amplification of β-actin template, and which was sensitive enough to reflect the difference in the initial copy number. Using this condition, the β-actin levels were determined for each reverse transcription reaction from each tissue. DNA contamination was minimized by DNase treatment and

20   by assuring a negative result when using first strand cDNA that was prepared without adding reverse transcriptase.

Using gene specific primers, the mRNA expression levels were determined in a variety of tissues. To date, 38 genes have been successfully examined by RT-PCR, five of which exhibit good specificity and sensitivity for breast tumors

25   (B15AG-1, B31GA1b, B38GA2a, B11A1a and B18AG1a). Figures 21A and 21B depict the results for three of these genes: B15AG-1 (SEQ ID NO:27), B31GA1b (SEQ ID NO:148) and B38GA2a (SEQ ID NO. 157). Table I summarizes the expression level of all the genes tested in normal breast tissue and breast tumors, and also in other tissues.

TABLE I

Percentage of Breast Cancer Antigens that are Expressed in Various Tissues

Breast Tissues	Over-expressed in Breast Tumors	84%
	Equally Expressed in Normals and Tumor	16%
Other Tissues	Over-expressed in Breast Tumors but not in any Normal Tissues	9%
	Over-expressed in Breast Tumors but Expressed in Some Normal Tissues	30%
	Over-expressed in Breast Tumors but Equally Expressed in All Other Tissues	61%

From the foregoing, it will be appreciated that, although specific embodiments of the invention have been described herein for the purpose of illustration, various modifications may be made without deviating from the spirit and scope of the invention.

CLAIMS

1.   An isolated polypeptide, comprising at least an immunogenic portion of a protein, or a variant thereof, wherein the protein comprises an amino acid sequence that is encoded by a polynucleotide sequence selected from the group consisting of:

(a) sequences recited in SEQ ID NOs: 1, 3-26, 28-77, 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-240, 243-245, 247, 250, 251, 253, 255, 257-266, 268, 269, 271-273, 275, 276, 278, 280, 281, 284, 288, 291-298, 301-303, 307, 313, 314, 316 and 317;

(b) sequences that hybridize to a sequence recited in any one of SEQ ID NOs:_ 1, 3-26, 28-77, 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-240, 243-245, 247, 250, 251, 253, 255, 257-266, 268, 269, 271-273, 275, 276, 278, 280, 281, 284, 288, 291-298, 301-303, 307, 313, 314, 316 and 317 under moderately stringent conditions; and

(c) complements of sequences of (a) or (b).

2.   An isolated polypeptide according to claim 1, wherein the polypeptide comprises an amino acid sequence that is encoded by a polynucleotide sequence recited in any one of SEQ ID NOs: 1, 3-26, 28-77, 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-240, 243-245, 247, 250, 251, 253, 255, 257-266, 268, 269, 271-273, 275, 276, 278, 280, 281, 284, 288, 291-298, 301-303, 307, 313, 314, 316 and 317 or a complement of any of the foregoing polynucleotide sequences.

3.   An isolated polypeptide comprising a sequence recited in any one of SEQ ID NOs: 299, 300, 304-306, 308 and 315.

4.   An isolated polynucleotide encoding at least 15 amino acid residues of a protein, or a variant thereof that differs in one or more substitutions, deletions, additions and/or insertions such that the ability of the variant to react with antigen-specific antisera is not substantially diminished, wherein the tumor protein

5   comprises an amino acid sequence that is encoded by a polynucleotide comprising a sequence recited in any one of SEQ ID NOs:_1, 3-26, 28-77, 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-240, 243-245, 247, 250, 251, 253, 255, 257-266, 268, 269, 271-273, 275, 276, 278, 280, 281, 284, 288, 291-298, 301-303, 307, 313, 314, 316 and 317 or a complement

10   of any of the foregoing sequences.

5.   An isolated polynucleotide encoding a protein, or a variant thereof, wherein the tumor protein comprises an amino acid sequence that is encoded by a polynucleotide comprising a sequence recited in any one of SEQ ID NOs: 1, 3-

15   26, 28-77, 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-240, 243-245, 247, 250, 251, 253, 255, 257-266, 268, 269, 271-273, 275, 276, 278, 280, 281, 284, 288, 291-298, 301-303, 307, 313, 314, 316 and 317 or a complement of any of the foregoing sequences.

20   6.   An isolated polynucleotide, comprising a sequence recited in any one of SEQ ID Nos: 1, 3-26, 28-77, 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-240, 243-245, 247, 250, 251, 253, 255, 257-266, 268, 269, 271-273, 275, 276, 278, 280, 281, 284, 288, 291-298, 301-303, 307, 313, 314, 316 and 317.

25

7.   An isolated polynucleotide, comprising a sequence that hybridizes to a sequence recited in any one of SEQ ID NOs: 1, 3-26, 28-77, 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-240, 243-245, 247, 250, 251, 253, 255, 257-266, 268, 269, 271-273,

30   275, 276, 278, 280, 281, 284, 288, 291-298, 301-303, 307, 313, 314, 316 and 317

under moderately stringent conditions.

8.   An isolated polynucleotide complementary to a polynucleotide according to any one of claims 4-7.

9.   An expression vector, comprising a polynucleotide according to any one of claims claim 4-8.

10.   A host cell transformed or transfected with an expression vector according to claim 9.

11.   An isolated antibody, or antigen-binding fragment thereof, that specifically binds to a protein that comprises an amino acid sequence that is encoded by a polynucleotide sequence recited in any one of SEQ ID NOs: 1, 3-26, 28-77, 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-240, 243-245, 247, 250, 251, 253, 255, 257-266, 268, 269, 271-273, 275, 276, 278, 280, 281, 284, 288, 291-298, 301-303, 307, 313, 314, 316 and 317 or a complement of any of the foregoing polynucleotide sequences.

12.   A fusion protein, comprising at least one polypeptide according to claim 1.

13.   A fusion protein according to claim 12, wherein the fusion protein comprises an expression enhancer that increases expression of the fusion protein in a host cell transfected with a polynucleotide encoding the fusion protein.

14.   A fusion protein according to claim 12, wherein the fusion protein comprises a T helper epitope that is not present within the polypeptide of claim 1.

15.   A fusion protein according to claim 12, wherein the fusion protein comprises an affinity tag.

16.   An isolated polynucleotide encoding a fusion protein according to claim 12.

17.   A pharmaceutical composition, comprising a physiologically acceptable carrier and at least one component selected from the group consisting of:

(a)   a polypeptide according to claim 1;

(b)   a polynucleotide according to claim 4;

(c)   an antibody according to claim 11;

(d)   a fusion protein according to claim 12; and

(e)   a polynucleotide according to claim 16.

18.   A vaccine comprising an immunostimulant and at least one component selected from the group consisting of:

(a)   a polypeptide according to claim 1;

(b)   a polynucleotide according to claim 4;

(c)   an antibody according to claim 11;

(d)   a fusion protein according to claim 12; and

(e)   a polynucleotide according to claim 16.

19.   A vaccine according to claim 18, wherein the immunostimulant is an adjuvant.

20.   A vaccine according to any claim 18, wherein the immunostimulant induces a predominantly Type I response.

21.   A method for inhibiting the development of a cancer in a patient, comprising administering to a patient an effective amount of a pharmaceutical

composition according to claim 17.

22.   A method for inhibiting the development of a cancer in a patient, comprising administering to a patient an effective amount of a vaccine according to claim 18.

23.   A pharmaceutical composition comprising an antigen-presenting cell that expresses a polypeptide according to claim 1, in combination with a pharmaceutically acceptable carrier or excipient.

24.   A pharmaceutical composition according to claim 23, wherein the antigen presenting cell is a dendritic cell or a macrophage.

25.   A vaccine comprising an antigen-presenting cell that expresses a polypeptide comprising at least an immunogenic portion of a protein, or a variant thereof, wherein the protein comprises an amino acid sequence that is encoded by a polynucleotide sequence selected from the group consisting of:

(a)   sequences recited in SEQ ID NOs: 1, 3-26, 28-86, 142-253, 255-298, 301-303, 307, 313, 314, 316 and 317;

(b)   sequences that hybridize to a sequence recited in any one of SEQ ID NOs:_ 1, 3-26, 28-86, 142-253, 255-298, 301-303, 307, 313, 314, 316 and 317 under moderately stringent conditions; and

(c)   complements of sequences of (i) or (ii);

in combination with an immunostimulant.

26.   A vaccine according to claim 25, wherein the immunostimulant is an adjuvant.

27.   A vaccine according to claim 25, wherein the immunostimulant induces a predominantly Type I response.

28.   A vaccine according to claim 25, wherein the antigen-presenting cell is a dendritic cell.

29.   A method for inhibiting the development of a cancer in a patient, comprising administering to a patient an effective amount of an antigen-presenting cell that expresses a polypeptide comprising at least an immunogenic portion of a protein, or a variant thereof, wherein the protein comprises an amino acid sequence that is encoded by a polynucleotide sequence selected from the group consisting of:

(a)   sequences recited in SEQ ID NOs: 1, 3-26, 28-86, 142-253, 255-298, 301-303, 307, 313, 314, 316 and 317;

(b)   sequences that hybridize to a sequence recited in any one of SEQ ID NOs: 1, 3-26, 28-86, 142-253, 255-298, 301-303, 307, 313, 314, 316 and 317 under moderately stringent conditions; and

(c)   complements of sequences encoded by a polynucleotide recited in any one of SEQ ID NOs: 1, 3-26, 28-86, 142-253, 255-298, 301-303, 307, 313, 314, 316 and 317;

and thereby inhibiting the development of a cancer in the patient.

30.   A method according to claim 29, wherein the antigen-presenting cell is a dendritic cell.

31.   A method according to any one of claims 21, 22 and 29, wherein the cancer is breast cancer.

32.   A method for removing tumor cells from a biological sample, comprising contacting a biological sample with T cells that specifically react with a protein, wherein the protein comprises an amino acid sequence that is encoded by a polynucleotide sequence selected from the group consisting of:

(i)   polynucleotides recited in any one of SEQ ID NOs: 1, 3-26, 28-86, 142-253, 255-298, 301-303, 307, 313, 314, 316 and 317; and

(ii)   complements of the foregoing polynucleotides;

wherein the step of contacting is performed under conditions and for a time sufficient to permit the removal of cells expressing the antigen from the sample.

33.   A method according to claim 32, wherein the biological sample is blood or a fraction thereof.

34.   A method for inhibiting the development of a cancer in a patient, comprising administering to a patient a biological sample treated according to the method of claim 32.

35.   A method for stimulating and/or expanding T cells specific for a protein, comprising contacting T cells with at least one component selected from the group consisting of:

(a)   polypeptides comprising at least an immunogenic portion of a protein, or a variant thereof, wherein the protein comprises an amino acid sequence that is encoded by a polynucleotide sequence selected from the group consisting of:

(i)   sequences recited in SEQ ID NOs: 1, 3-26, 28-86, 142-253, 255-298, 301-303, 307, 313, 314, 316 and 317;

(ii)   sequences that hybridize to a sequence recited in any one of SEQ ID NOs: 1, 3-26, 28-86, 142-253, 255-298, 301-303, 307, 313, 314, 316 and 317 under moderately stringent conditions; and

(iii)   complements of sequences of (i) or (ii);

(b)   polynucleotides encoding a polypeptide of (a); and

(c)   antigen presenting cells that express a polypeptide of (a);

under conditions and for a time sufficient to permit the stimulation and/or expansion of T cells.

36. An isolated T cell population, comprising T cells prepared according to the method of claim 35.

37. A method for inhibiting the development of a cancer in a patient, comprising administering to a patient an effective amount of a T cell population according to claim 36.

38. A method for inhibiting the development of a cancer in a patient, comprising the steps of:

(a) incubating CD4$^+$ and/or CD8+ T cells isolated from a patient with at least one component selected from the group consisting of:

(i) polypeptides comprising at least an immunogenic portion of a protein, or a variant thereof, wherein the protein comprises an amino acid sequence that is encoded by a polynucleotide sequence selected from the group consisting of:

(1) sequences recited in SEQ ID NOs: 1, 3-26, 28-86, 142-253, 255-298, 301-303, 307, 313, 314, 316 and 317;

(2) sequences that hybridize to a sequence recited in any one of SEQ ID NOs:_ 1, 3-26, 28-86, 142-253, 255-298, 301-303, 307, 313, 314, 316 and 317 under moderately stringent conditions; and

(3) complements of sequences of (1) or (2);

(ii) polynucleotides encoding a polypeptide of (i); and

(iii) antigen presenting cells that expresses a polypeptide of (i);

such that T cells proliferate; and

(b) administering to the patient an effective amount of the proliferated T cells, and thereby inhibiting the development of a cancer in the patient.

39. A method for inhibiting the development of a cancer in a patient, comprising the steps of:

(a)	incubating CD4$^+$ and/or CD8+ T cells isolated from a patient with at least one component selected from the group consisting of:

(i)	polypeptides comprising at least an immunogenic portion of a protein, or a variant thereof, wherein the protein comprises an amino acid sequence that is encoded by a polynucleotide sequence selected from the group consisting of:

(1)	sequences recited in SEQ ID NOs: 1, 3-26, 28-86, 142-253, 255-298, 301-303, 307, 313, 314, 316 and 317;

(2)	sequences that hybridize to a sequence recited in any one of SEQ ID NOs:_ 1, 3-26, 28-86, 142-253, 255-298, 301-303, 307, 313, 314, 316 and 317 under moderately stringent conditions; and

(3)	complements of sequences of (1) or (2);

(ii)	polynucleotides encoding a polypeptide of (i); and

(iii)	antigen presenting cells that express a polypeptide of (i);

such that T cells proliferate;

(b)	cloning at least one proliferated cell to provide cloned T cells; and

(c)	administering to the patient an effective amount of the cloned T cells, and thereby inhibiting the development of a cancer in the patient.

40.	A method for determining the presence or absence of a cancer in a patient, comprising the steps of:

(a)	contacting a biological sample obtained from a patient with a binding agent that binds to a protein, wherein the protein comprises an amino acid sequence that is encoded by a polynucleotide sequence recited in any one of SEQ ID NOs: 1, 3-26, 28-86, 142-253, 255-298, 301-303, 307, 313, 314, 316 and 317 or a complement of any of the foregoing polynucleotide sequences;

(b)	detecting in the sample an amount of polypeptide that binds to the binding agent; and

(c)   comparing the amount of polypeptide to a predetermined cut-off value, and therefrom determining the presence or absence of a cancer in the patient.

41.   A method according to claim 40, wherein the binding agent is an antibody.

42.   A method according to claim 43, wherein the antibody is a monoclonal antibody.

43.   A method according to claim 40, wherein the cancer is breast cancer.

44.   A method for monitoring the progression of a cancer in a patient, comprising the steps of:

(a)   contacting a biological sample obtained from a patient at a first point in time with a binding agent that binds to a protein, wherein the protein comprises an amino acid sequence that is encoded by a polynucleotide sequence recited in any one of SEQ ID NOs: 1, 3-26, 28-86, 142-253, 255-298, 301-303, 307, 313, 314, 316 and 317 or a complement of any of the foregoing polynucleotide sequences;

(b)   detecting in the sample an amount of polypeptide that binds to the binding agent;

(c)   repeating steps (a) and (b) using a biological sample obtained from the patient at a subsequent point in time; and

(d)   comparing the amount of polypeptide detected in step (c) to the amount detected in step (b) and therefrom monitoring the progression of the cancer in the patient.

45.   A method according to claim 44, wherein the binding agent is

an antibody.

46. A method according to claim 45, wherein the antibody is a monoclonal antibody.

5

47. A method according to claim 44, wherein the cancer is a breast cancer.

48. A method for determining the presence or absence of a cancer

10 in a patient, comprising the steps of:

(a) contacting a biological sample obtained from a patient with an oligonucleotide that hybridizes to a polynucleotide that encodes a protein, wherein the protein comprises an amino acid sequence that is encoded by a polynucleotide sequence recited in any one of SEQ ID NO: 1, 3-26, 28-86, 142-253, 255-298, 301-

15 303, 307, 313, 314, 316 and 317 or a complement of any of the foregoing polynucleotide sequences;

(b) detecting in the sample an amount of a polynucleotide that hybridizes to the oligonucleotide; and

(c) comparing the amount of polynucleotide that hybridizes to the

20 oligonucleotide to a predetermined cut-off value, and therefrom determining the presence or absence of a cancer in the patient.

49. A method according to claim 48, wherein the amount of polynucleotide that hybridizes to the oligonucleotide is determined using a

25 polymerase chain reaction.

50. A method according to claim 48, wherein the amount of polynucleotide that hybridizes to the oligonucleotide is determined using a hybridization assay.

30

51.   A method for monitoring the progression of a cancer in a patient, comprising the steps of:

(a)   contacting a biological sample obtained from a patient with an oligonucleotide that hybridizes to a polynucleotide that encodes a protein, wherein

5   the protein comprises an amino acid sequence that is encoded by a polynucleotide sequence recited in any one of SEQ ID NO: 1, 3-26, 28-86, 142-253, 255-298, 301-303, 307, 313, 314, 316 and 317 or a complement of any of the foregoing polynucleotide sequences;

(b)   detecting in the sample an amount of a polynucleotide that

10   hybridizes to the oligonucleotide;

(c)   repeating steps (a) and (b) using a biological sample obtained from the patient at a subsequent point in time; and

(d)   comparing the amount of polynucleotide detected in step (c) to the amount detected in step (b) and therefrom monitoring the progression of the

15   cancer in the patient.

52.   A method according to claim 51, wherein the amount of polynucleotide that hybridizes to the oligonucleotide is determined using a polymerase chain reaction.

20

53.   A method according to claim 51, wherein the amount of polynucleotide that hybridizes to the oligonucleotide is determined using a hybridization assay.

25   54.   A diagnostic kit, comprising:

(a)   one or more antibodies according to claim 11; and

(b)   a detection reagent comprising a reporter group.

55.   A kit according to claim 54, wherein the antibodies are

30   immobilized on a solid support.

56. A kit according to claim 54, wherein the detection reagent comprises an anti-immunoglobulin, protein G, protein A or lectin.

5   57. A kit according to claim 54, wherein the reporter group is selected from the group consisting of radioisotopes, fluorescent groups, luminescent groups, enzymes, biotin and dye particles.

58. An oligonucleotide comprising 10 to 40 contiguous nucleotides

10   that hybridize under moderately stringent conditions to a polynucleotide that encodes a protein, wherein the protein comprises an amino acid sequence that is encoded by a polynucleotide sequence recited in any one of SEQ ID NOs: 1, 3-26, 28-77, 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-240, 243-245, 247, 250, 251, 253, 255, 257-266, 268, 269, 271-273,

15   275, 276, 278, 280, 281, 284, 288, 291-298, 301-303, 307, 313, 314, 316 and 317 or a complement of any of the foregoing polynucleotides.

59. A oligonucleotide according to claim 58, wherein the oligonucleotide comprises 10-40 contiguous nucleotides recited in any one of SEQ ID

20   Nos: 1, 3-26, 28-77, 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-240, 243-245, 247, 250, 251, 253, 255, 257-266, 268, 269, 271-273, 275, 276, 278, 280, 281, 284, 288, 291-298, 301-303, 307, 313, 314, 316 and 317.

25   60. A diagnostic kit, comprising:

(a)   an oligonucleotide according to claim 59; and

(b)   a diagnostic reagent for use in a polymerase chain reaction or hybridization assay.

COMPOSITIONS AND METHODS FOR THE TREATMENT AND DIAGNOSIS OF BREAST CANCER

5

ABSTRACT OF THE DISCLOSURE

Compositions and methods for the detection and therapy of breast
10   cancer are disclosed. The compounds provided include nucleotide sequences that are
preferentially expressed in breast tumor tissue, as well as polypeptides encoded by
such nucleotide sequences. Vaccines and pharmaceutical compositions comprising
such compounds are also provided and may be used, for example, for the prevention
and treatment of breast cancer. The polypeptides may also be used for the production
15   of antibodies, which are useful for diagnosing and monitoring the progression of
breast cancer in a patient.

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cDNA PREPARED FROM
NORMAL BREAST TISSUE
FROM THE SAME PATIENT

cDNA PREPARED
FROM BREAST TUMOR

← B18Ag1

Fig. 1

BREAST TUMOR mRNA

NORMAL BREAST TISSUE mRNA
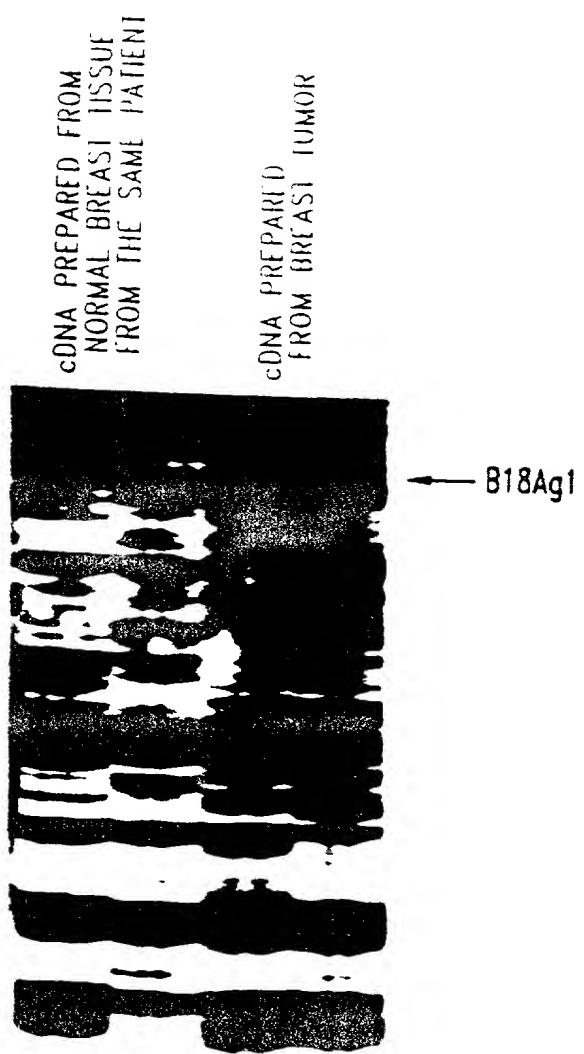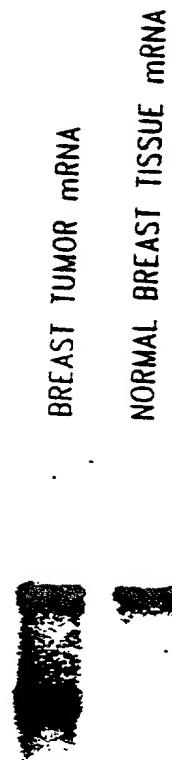
Fig. 2

Fig. 3

GENOMIC CLONE MAP
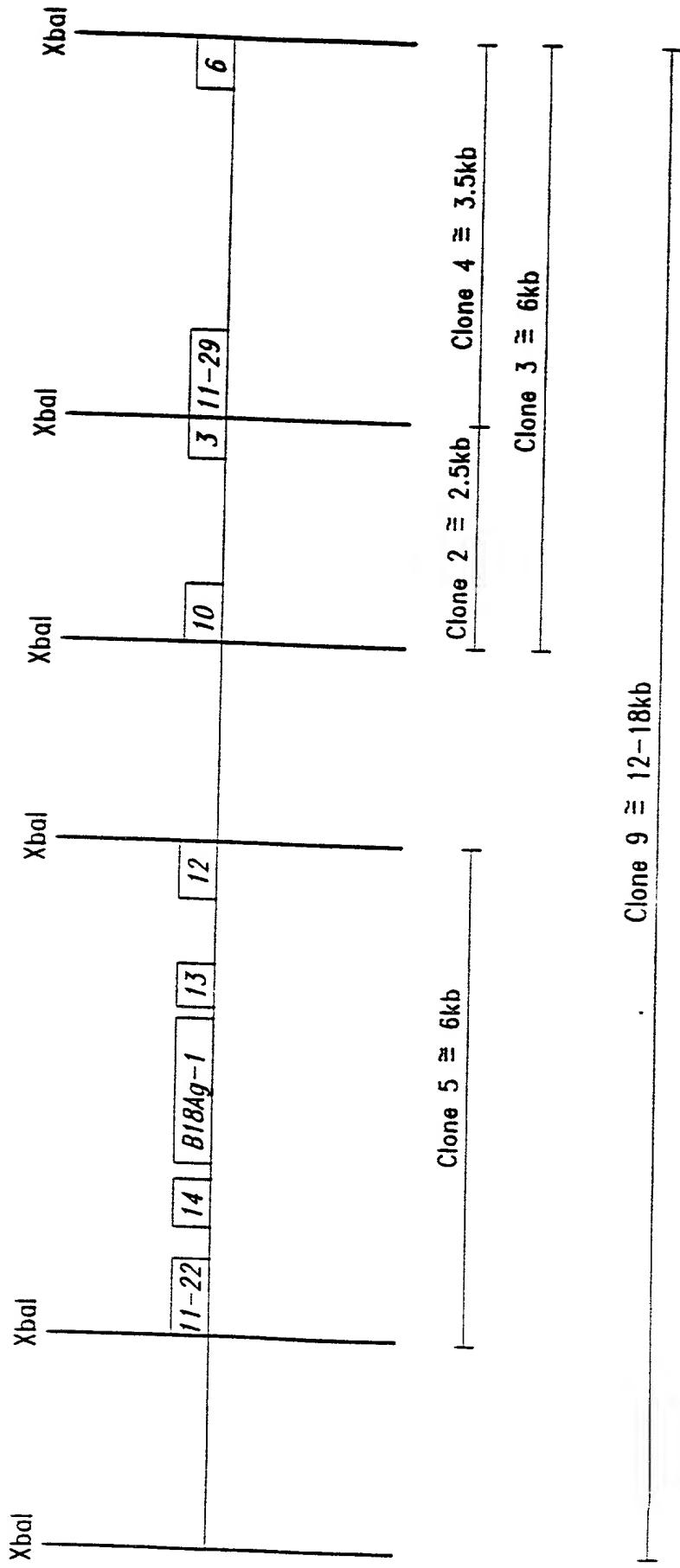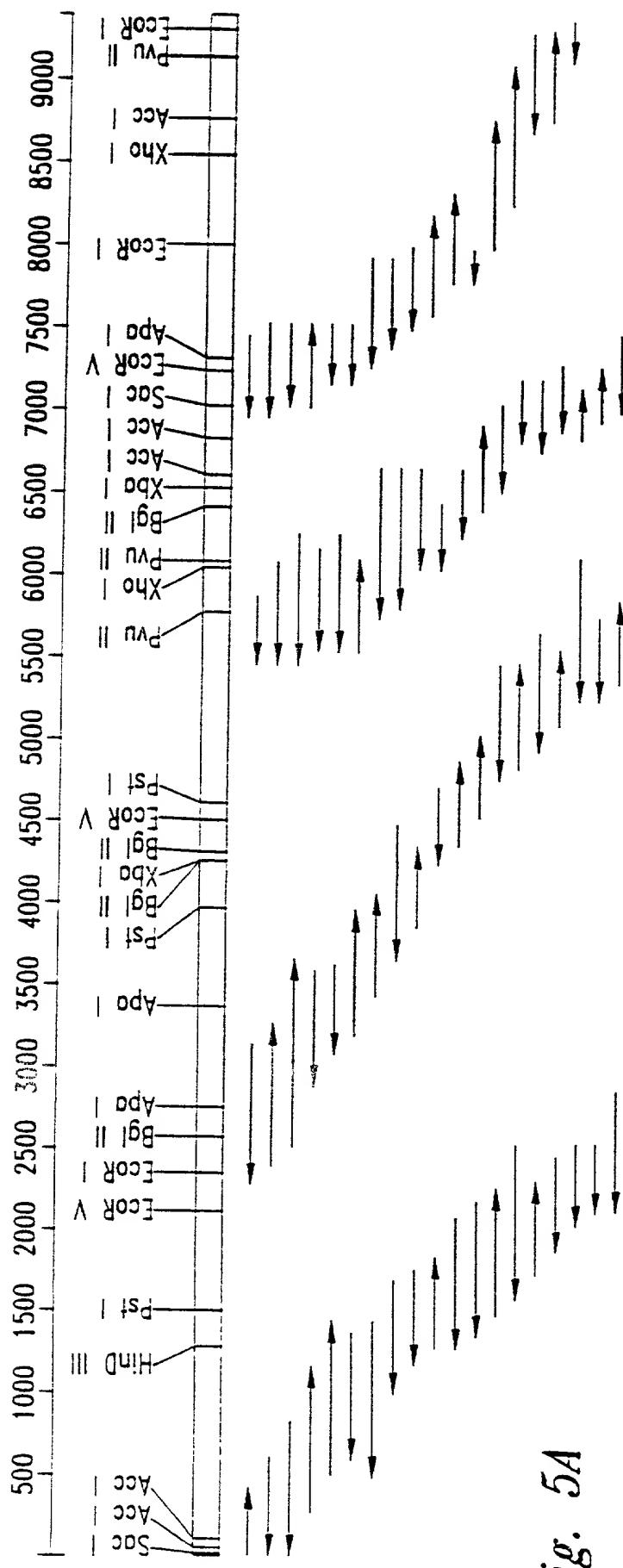
Xbal   Xbal   Xbal   Xbal   Xbal

        | 11-22 | 14 | B18Ag-1 | 13 | | 12 | | 10 | | 3 | 11-29 | | 6 |

        |——————————— Clone 5 ≅ 6kb ———————————|

                                        |—— Clone 2 ≅ 2.5kb ——|

                                                                    |———— Clone 4 ≅ 3.5kb ————|

                                            |——————————— Clone 3 ≅ 6kb ———————————|

        |——————————————————————— Clone 9 ≅ 12-18kb ———————————————————————|

Fig. 4

Fig. 5A

Fig. 5B

LTR

gag

pol

LTR

Sac I
Acc I
Acc I

HinD III
Pst I

EcoR V
EcoR I
Bgl II
Apa I

Apa I

Pst I
Bgl II
Xba I
Bgl II
EcoR V
Pst I

Pvu II
Xho I
Pvu II
Bgl II
Xba I
Acc I
Acc I
Sac I
EcoR V
Apa I

EcoR I

Xho I
Acc I
Pvu II
EcoR I

500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 6000 6500 7000 7500 8000 8500 9000

1
2
3
4
5
6
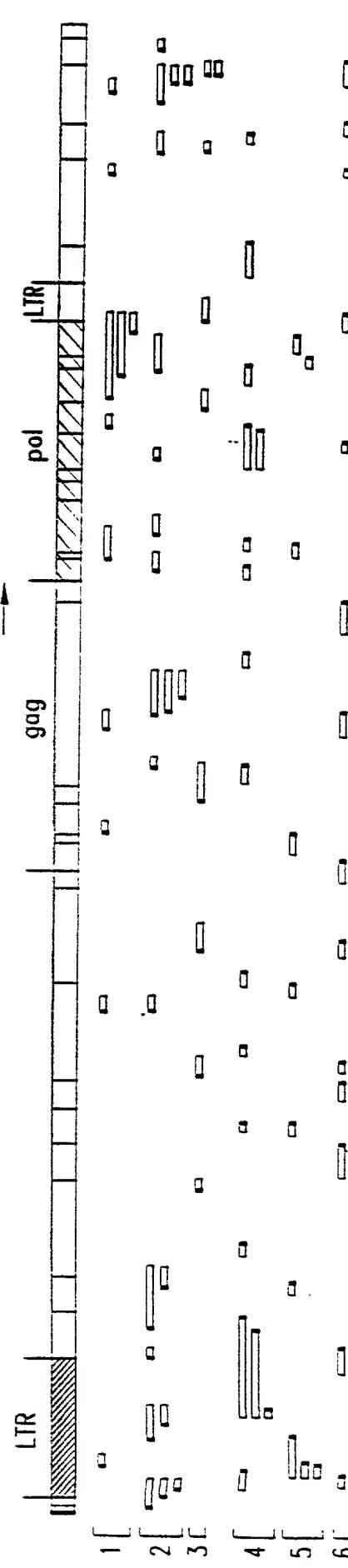
NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B18Ag1


```
TTA GAG ACC CAA TTG GGA CCT AAT TGG GAC CCA AAT TTC TCA AGT GGA    48
Leu Glu Thr Gln Leu Gly Pro Asn Trp Asp Pro Asn Phe Ser Ser Gly
 1               5                  10              15

GGG AGA ACT TTT GAC GAT TTC CAC CGG TAT CTC CTC GTG GGT ATT CAG    96
Gly Arg Thr Phe Asp Asp Phe His Arg Tyr Leu Leu Val Gly Ile Gln
             20                  25                  30

GGA GCT GCC CAG AAA CCT ATA AAC TTG TCT AAG GCG ATT GAA GTC GTC   144
Gly Ala Ala Gln Lys Pro Ile Asn Leu Ser Lys Ala Ile Glu Val Val
             35                  40                  45

CAG GGG CAT GAT GAG TCA CCA GGA GTG TTT TTA GAG CAC CTC CAG GAG   192
Gln Gly His Asp Glu Ser Pro Gly Val Phe Leu Glu His Leu Gln Glu
         50                  55                  60

GCT TAT CGG ATT TAC ACC CCT TTT GAC CTG GCA GCC CCC GAA AAT AGC   240
Ala Tyr Arg Ile Tyr Thr Pro Phe Asp Leu Ala Ala Pro Glu Asn Ser
65                  70                  75                  80

CAT GCT CTT AAT TTG GCA TTT GTG GCT CAG GCA GCC CCA GAT AGT AAA   288
His Ala Leu Asn Leu Ala Phe Val Ala Gln Ala Ala Pro Asp Ser Lys
                 85                  90                  95

AGG AAA CTC CAA AAA CTA GAG GGA TTT TGC TGG AAT GAA TAC CAG TCA   336
Arg Lys Leu Gln Lys Leu Glu Gly Phe Cys Trp Asn Glu Tyr Gln Ser
                100                 105                 110

GCT TTT AGA GAT AGC CTA AAA GGT TTT                       .       363
Ala Phe Arg Asp Ser Leu Lys Gly Phe
                115                 120
```

Fig. 6

NUCLEOTIDE SEQUCNE OF THE REPRESENTATIVE
BREAST–TUMOR SPECIFIC cDNA 817Ag1

GC TGGGCACAGT GGCTCATACC TGTAATCCTG ACCGTTTCAG AGGCTCAGGT   60

CG CTTGAGCCCA AGATTTCAAG ACTAGTCTGG GTAACATAGT GAGACCCJAT   120

AA AAATAAAAAA ATGAGCCTGG TGTAGTGGCA CACACCAGCT GAGGAGGGAG   180

CT AGGAGA   196

Fig. 7

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B17Ag2

```
GC TTGGGGGCTC TGACTAGAAA TTCAAGGAAC CTGGGATTCA AGTCCAACTG        60
AC TTACACTGTG GNCTCCAATA AACTGCTTCT TTCCTATTCC CTCTCTATTA       120
AA GGAAAACGAT GTCTGTGTAT AGCCAAGTCA GNTATCCTAA AAGGAGATAC       180
AT TAAATATCAG AATGTAAAAC CTGGGAACCA GGTTCCCAGC CTGGGATTAA       240
CA AGAAGACTGA ACAGTACTAC TGTGAAAAGC CCGAAGNGGC AATATGTTCA       300
TT GAAGGATGGC TGGGAGAATG AATGCTCTGT CCCCCAGTCC CAAGCTCACT       360
CT CCTTTATAGC CTAGGAGA                                          388
```

Fig. 8

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B13Ag2a

```
GC CTATAATCAT GTTTCTCATT ATTTTCACAT TTTATTAACC AATTTCTGTT      60

AA AATATGAGGG AAATATATGA AACAGGGAGG CAATGTTCAG ATAATTGATC     120

TG ATTTCTACAT CAGATGCTCT TTCCTTTCCT GTTTATTTCC TTTTTATTTC     180

GG TCGAATGTAA TAGCTTTGTT TCAAGAGAGA GTTTTGGCAG TTTCTGTAGC     240

CT GCTCATGTCT CCAGGCATCT ATTTGCACTT TAGGAGGTGT CGTGGGAGAC     300

CT ATTTTTTCCA TATTTGGGCA ACTACTA                             337
```

Fig. 9

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B13Ag1b

```
GC CATACAGTGC CTTTCCATTT ATTTAACCCC CACCTGAACG GCATAAACTG     60

GC TGGTGTTTTT TACTGTAAAC AATAAGGAGA CTTTGCTCTT CATTTAAACC    120

AT TTCATATTTT ACGCTCGAGG GTTTTTACCG GTTCCTTTTT ACACTCCTTA    180

TT TAAGTCGTTT GGAACAAGAT ATTTTTTCTT TCCTGGCAGC TTTTAACATT    240

TT TGTGTCTGGG GGACTGCTGC TCACTGTTTC TCACAGTTCC AAATCAAGGC    300

CC AAGAAAAAAA AATTTTTTTG TTTTATTTGA AACTGGACCG GATAAACGGT    360

CG GCTGCTGTAT ATAGTTTTAA ATGGTTTATT GCACCTCCTT AAGTTGCACT    420

GG GGGGNTTTTG NATAGAAAGT NTTTANTCAC ANAGTCACAG GGACTTTTNT    480

NA CTGAGCTAAA AAGGGCTGNT TTTCGGGTGG GGGCAGATGA AGGCTCACAG    540

TC TCTTAGAGGG GGGAACTNCT A                                    571
```

Fig. 10

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST–TUMOR SPECIFIC cDNA B13Ag1a

```
TA ATAACTTAAA TATATTTTGA TCACCCACTG GGGTGATAAG ACAATAGATA      60
TT TCCAAAAAGC ATAAAACCAA AGTATCATAC CAAACCAAAT TCATACTGCT     120
CC GCACTGAAAC TTCACCTTCT AACTGTCTAC CTAACCAAAT TCTACCCTTC     180
GG TGCGTGCTCA CTACTCTTTT TTTTTTTTTT TTTNTTTTGG AGATGGAGTC     240
CA GCCCAGGGGT GGAGTACAAT GGCACAACCT CAGCTCACTG NAACCTCCGC     300
TT CATGAGATTC TCCTGNTTCA GCCTTCCCAG TAGCTGGGAC TACAGGTGTG     360
TG CCTGGNTAAT CTTTTTTNGT TTTNGGGTAG AGATGGGGGT TTTACATGTT     420
TG GTNTCGAACT CCTGACCTCA AGTGATCCAC CCACCTCAGG CTCCCAAAGT     480
TA CAGACATGAG CCACTGNGCC CAGNCCTGGT GCATGCTCAC TTCTCTAGGC     540
                                                 .            548
```

Fig. 11

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B11Ag1

```
TG CACATGCAGA ATATTCTATC GGTACTTCAG CTATTACTCA TTTTGATGGC      60

AG CCTATCCTCA AGATGAGTAT TTAGAAAGAA TTGATTTAGC GATAGACCAA     120

GC ACTCTGACTA CACGAAATTG TTCAGATGTG ATGGATTTAT GACAGTTGAT     180

GA GATTATTAAG TGATTATTTT AAAGGGAATC CATTAATTCC AGAATATCTT     240

TC AAGATGATAT AGAAATAGAA CAGAAAGAGA CTACAAATGA AGATGTATCA     300

TA TTGAAGAGCC TATAGTAGAA AATGAATTAG CTGCATTTAT TAGCCTTACA     360

TT TTCCTGATGA ATCTTATATT CAGCCATCGA CATAGCATTA CCTGATGGGC     420

GA ATAATAGAAA CTGGGTGCGG GGCTATTGAT GAATTCATCC NCAGTAAATT     480

AC AAAATATAAC TCGATTGCAT TTGGATGATG GAATACTAAA TCTGGCAAAA     540

GG AGCTACTAGT AACCTCTCTT TTTGAGATGC AAAATTTTCT TTTAGGGTTT     600

CT ACTTTACGGA TATTGGAGCA TAACGGGA                             638
```

Fig. 12

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B3CA3c

```
ACTGATGGAT GTCGCCGGAG GCGAGGGGCC TTATCTGATG CTCGGCTGCC TGTTCGTGAT    60

GTGCGCGGCG ATTGGGCTGT TTATCTCAAA CACCGCCACG GCGGTGCTGA TGGCGCCTAT   120

TGCCTTAGCG GCGGCGAAGT CAATGGGCGT CTCACCCTAT CCTTTTGCCA TGGTGGTGGC   180

GATGGCGGCT TCGGCGGCGT TTATGACCCC GGTCTCCTCG CCGGTTAACA CCCTGGTGCT   240

TGGCCCTGGC AAGTACTCAT TTAGCGATTT TGTCAAAATA GGCGTG                   286
```

Fig. 13

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B9CG1

```
AG CAGCCCCTTC TTCTCAATTT CATCTGTCAC TACCCTGGTG TAGTATCTCA        60

CA TTTTTATAGC CTCCTCCCTG GTCTGTCTTT TGATTTTCCT GCCTGTAATC       120

AC ATAACTGCAA GTAAACATTT CTAAAGTGTG GTTATGCTCA TGTCACTCCT       180

AA ATAGTTTCCA TTACCGTCTT AATAAAATTC GGATTTGTTC TTTNCTATTN       240

CA CCTATGACCG AA                                               262
```

Fig. 14

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE BREAST-TUMOR SPECIFIC cDNA B9CG3

```
AG CAAAGCCAGT GGTTTGAGCT CTCTACTGTG TAAACTCCTA AACCAAGGCC       60

TA AATGGTGGCA GGATTTTTAT TATAAACATG TACCCATGCA AATTTCCTAT      120

GA TATATTCTTC TACATTTAAA CAATAAAAAT AATCTATTTT TAAAAGCCTA      180

AG TTAGGTAAGA GTGTTTAATG AGAGGGTATA AGGTATAAAT CACCAGTCAA      240

TG CCTATGACCG A                                                261
```

Fig. 15

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B2CA2

GG GCATGGACGC AGACGCCTGA CGTTTGGCTG AAAATCTTTC ATTGATTCGT   60

AT AGGAAAATTC CCAAAGAGGG AATGTCCTGT TGCTCGCCAG TTTTTNTGTT   120

GG ANAAGGCAAN GAGCTCTTCA GACTATTGGN ATTNTCGTTC GGTCTTCTGC   180

CG NCTTGCNANG ATCTTCAT   208

Fig. 16

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST–TUMOR SPECIFIC cDNA B3CA1

```
GG GCATGGACGC AGACGCCTGA CGTTTGGCTG AAAATCTTTC ATTGATTCGT        60

AT AGGAAAATTC CCAAAGAGGG AATGTCCTGT TGCTCGCCAG TTTTTNTGTT       120

GG ANAAGGCAAN GAGCTCTTCA GACTATTGGN ATTNTCGTTC GGTCTTCTGC       180

CG NCTTGCNANG ATCTTCAT                                         208
```

Fig. 17

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B3CA2

```
GG GCATGGACGC AGACGCCTGA CGTTTGGCTG AAAATCTTTC ATTGATTCGT      60

AT AGGAAAATTC CCAAAGAGGG AATGTCCTGT TGCTCGCCAG TTTTTNTGTT     120

GG ANAAGGCAAN GAGCTCTTCA GACTATTGGN ATTNTCGTTC GGTCTTCTGC     180

CG NCTTGCNANG ATCTTCAT                                        208
```

Fig. 18

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST—TUMOR SPECIFIC cDNA B3CA3

AG GGAGCAAGGA GAAGGCATGG AGAGGCTCAN GCTGGTCCTG GCCTACGACT   60

CT GTCGCCGGGG ATGGTGGAGA ACTGAAGCGG GACCTCCTCG AGGTCCTCCG   120

TC NCCGTCCAGG AGGAGGGTCT TTCCGTGGTC TNGGAGGAGC GGGGGGAGAA   180

TC ATGGTCNACA TCCC   204

Fig. 19

NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B4CA1

```
TC AGGAGCGGGT AGAGTGGCAC CATTGAGGGG ATATTCAAAA ATATTATTTT      60

TG ATAGTTGCTG AGTTTTTCTT TGACCCATGA GTTATATTGG AGTTTATTTT     120

CC AATCGCATGG ACATGTTAGA CTTATTTTCT GTTAATGATT NCTATTTTTA     180

GA TTTGAGAAAT TGGTTNTTAT TATATCAATT TTTGGTATTT GTTGAGTTTG     240

GC TTAGTATGTG ACCA                                            264
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Fig. 20

Fig. 21A
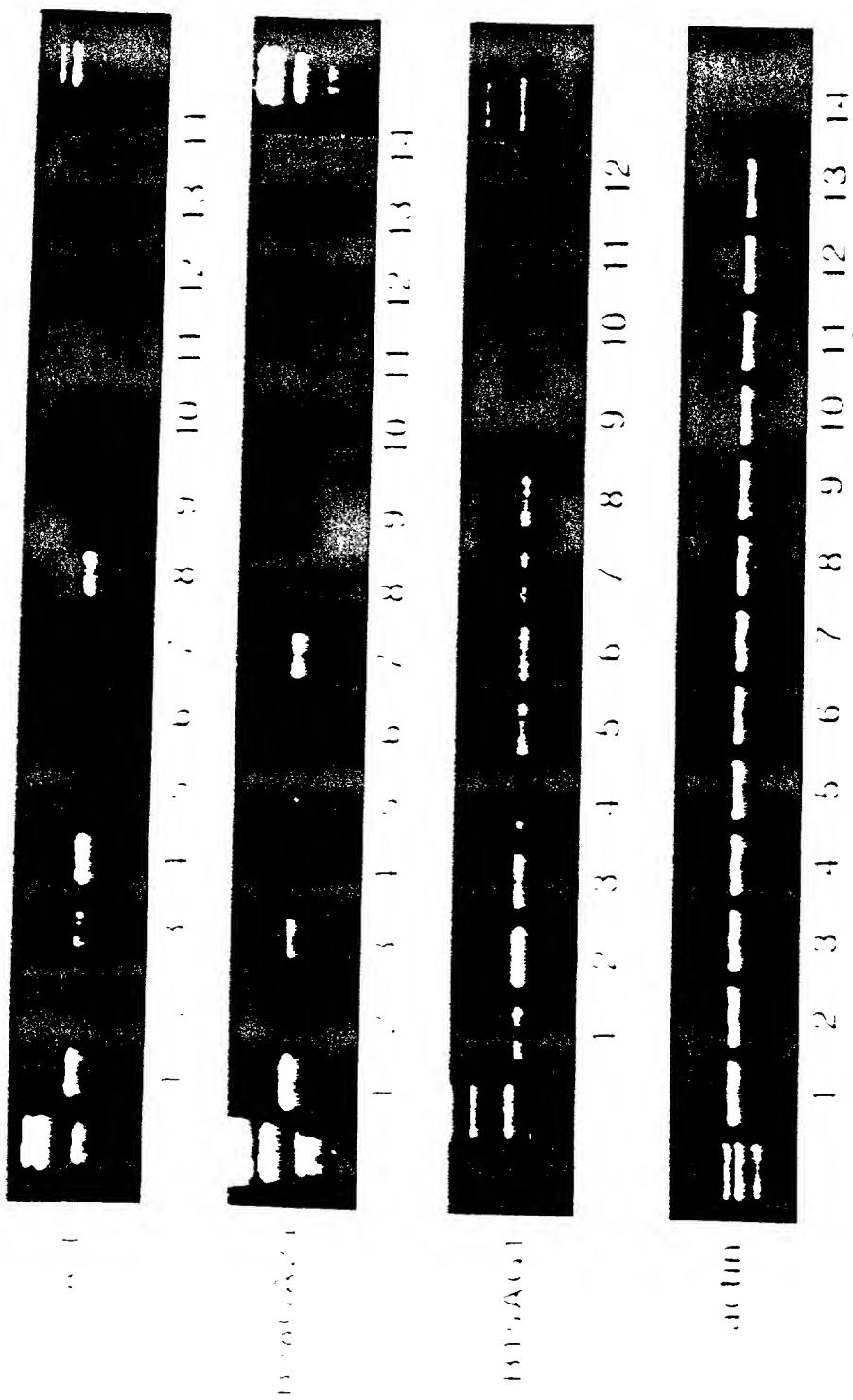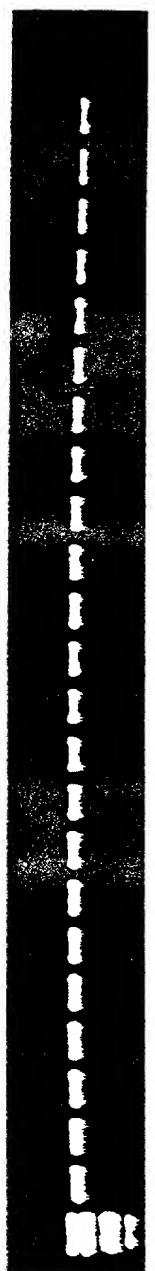
Fig. 21B

Recogntion of Peptide by D142 anti-B11-8 CTL line
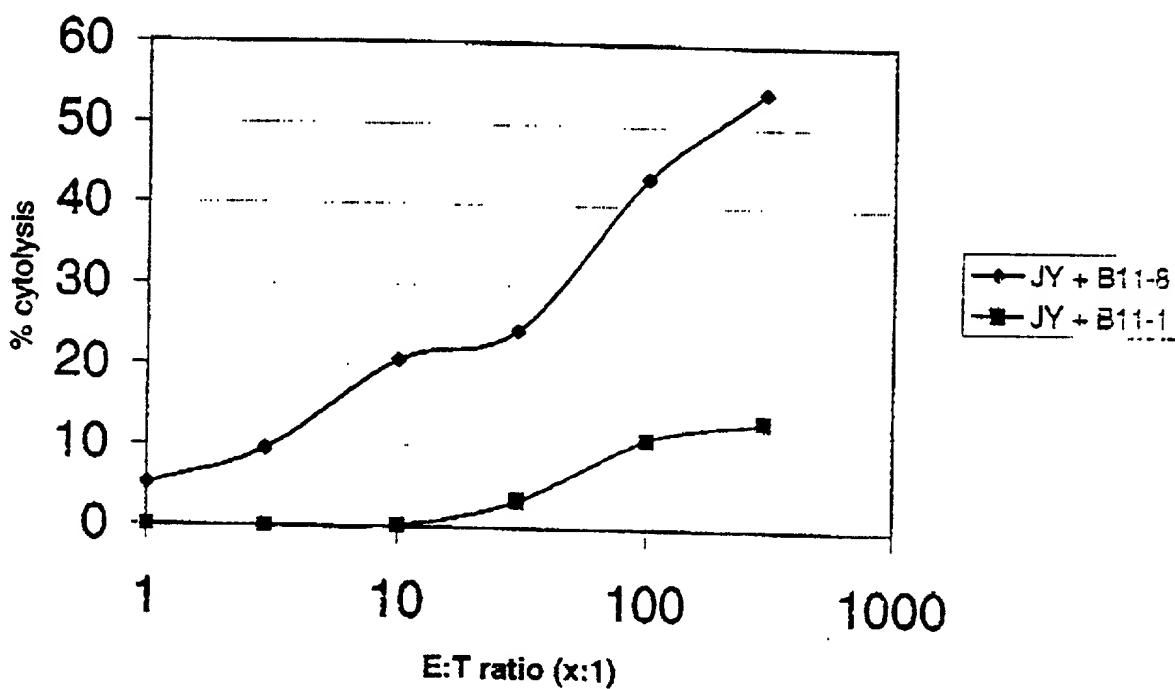
Fig. 22
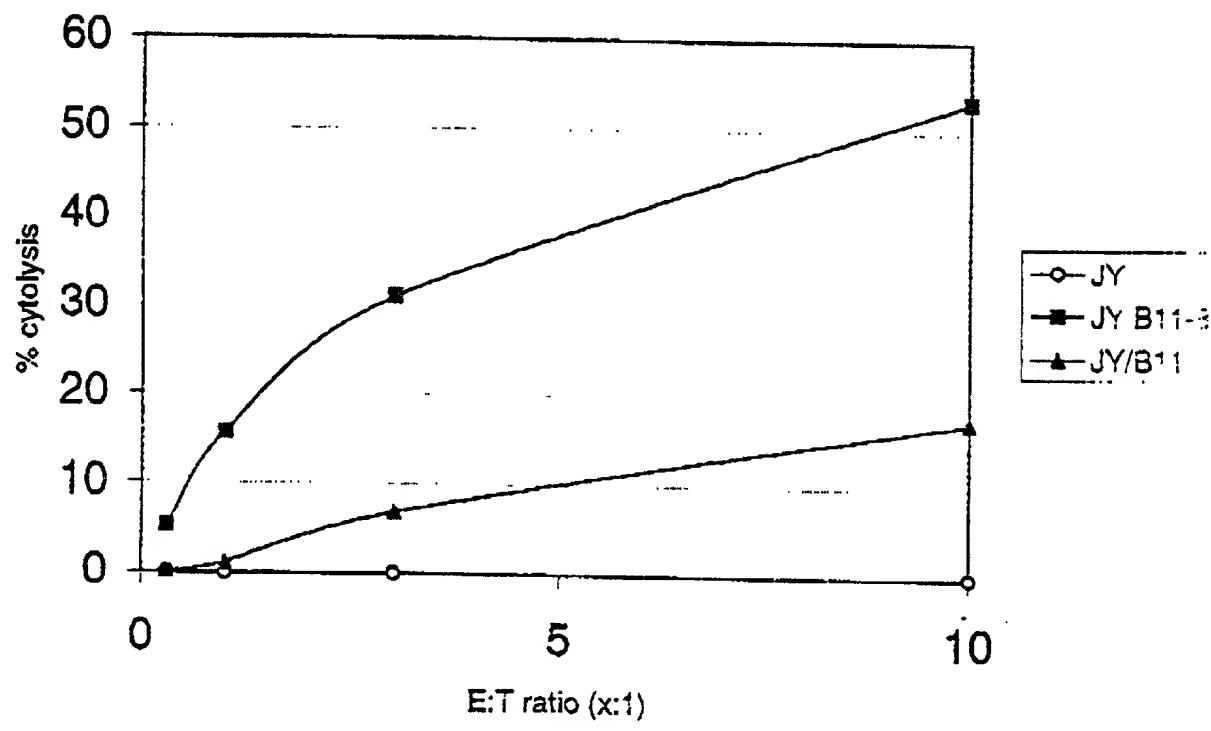
Fig. 23

Recgonition of Tumor Cell Lines by Clone A1

··◇·· LT-140-22 (B11+, A2-)
——◆—— LT-140-22/A2 (B11+, A2+)
–·△·– SW620 (B11-, A2+)
··○·· CAMA-1
——●—— CAMA-1/B11
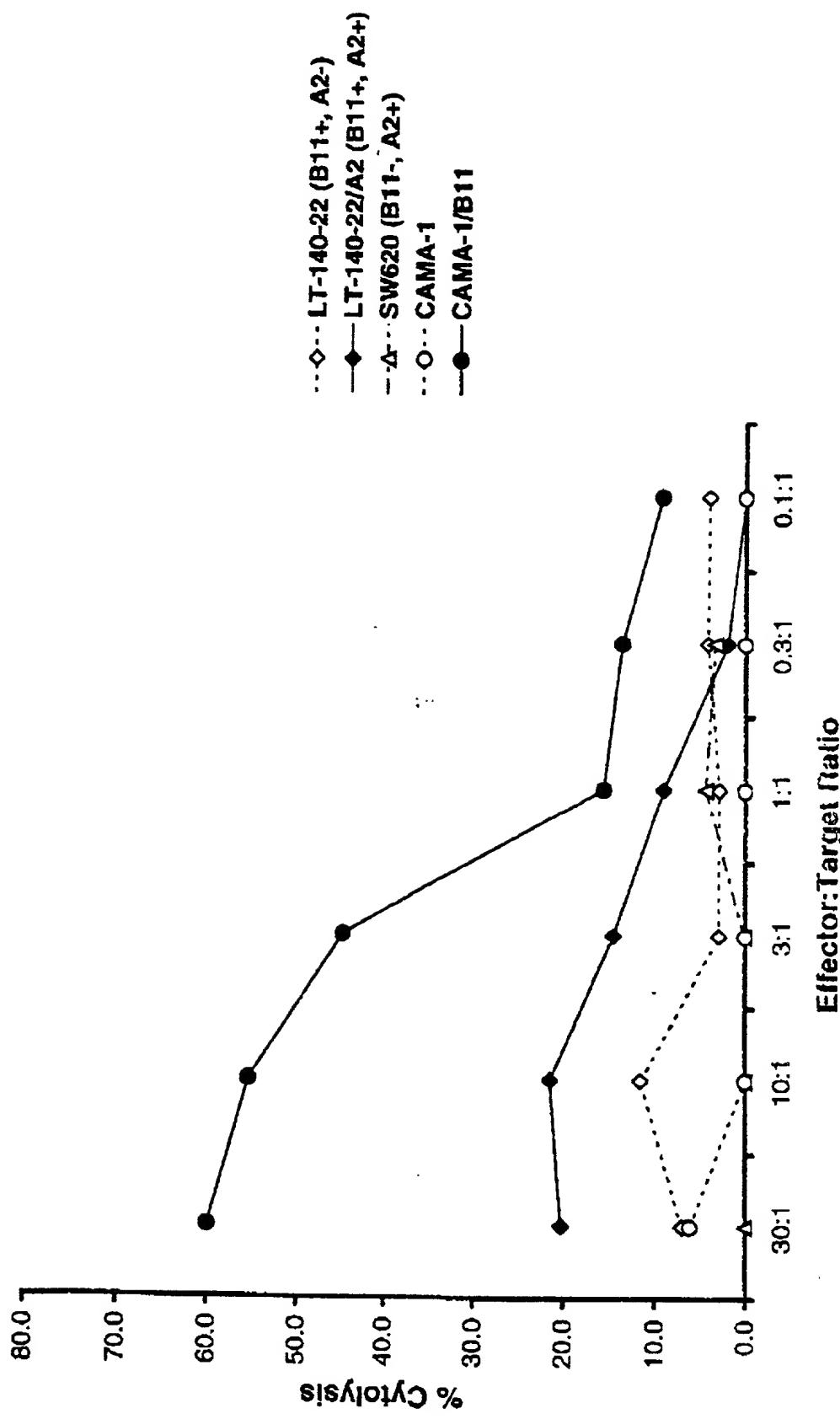
Fig. 24

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants	:	Tony N. Frudakis, John M. Smith, Steven G. Reed, Lynda E. Misher Marc W. Retter and Davin C. Dillon.
Filed	:	March 23, 2000
For	:	COMPOSITIONS AND METHODS FOR THE TREATMENT AND DIAGNOSIS OF BREAST CANCER

Docket No. : 210121.419C7

Date : March 23, 2000

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

DECLARATION

Sir:

I, Monica Steinborn, in accordance with 37 C.F.R. § 1.821(f) do hereby declare that, to the best of my knowledge, the content of the paper entitled "Sequence Listing" and the computer readable copy contained within the floppy disk are the same.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Dated this 23rd day of March, 2000.

Monica Steinborn
Legal Assistant

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Wpn/210121 – Corixa/419c7/419c7dec doc

SEQUENCE LISTING

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<110> Frudakis, Tony N.
      Smith, John M.
      Reed, Steven G.
      Misher, Lynda
      Retter, Marc W.
      Dillon, Davin C.

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      TREATMENT AND DIAGNOSIS OF BREAST CANCER


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            20                  25                  30
Gly Ala Ala Gln Lys Pro Ile Asn Leu Ser Lys Ala Ile Glu Val Val
        35                  40                  45
Gln Gly His Asp Glu Ser Pro Gly Val Phe Leu Glu His Leu Gln Glu
    50                  55                  60
Ala Tyr Arg Ile Tyr Thr Pro Phe Asp Leu Ala Ala Pro Glu Asn Ser
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atggaagggg  tgctcctgac  caaactcagc  cattgatcaa  tgttagggaa  actgatcagg   600
gaagccggga  atttcattaa  caacccgcca  cacagcttga  acattgtgag  gttcagtgac   660
ccttcaaggg  gccactccac  tccaactttg  gccattctac  tttgcnaaat  ttccaaaact   720
tcctttttta  aggccgaatc  cntantccct  naaaaacnaa  aaaaaatctg  cncctattct   780
ggaaaaggcc  cancccttac  caggctggaa  gaaattttnc  cttttttttt  ttttgaagg    840
cntttnttaa  attgaacctn  aattcncccc  cccaaaaaaa  aacccnccng  ggggcggat    900
ttccaaaaac  naattccctt  accaaaaaac  aaaaacccnc  ccttnttccc  ttccnccctn   960
ttcttttaat  tagggagaga  tnaagccccc  caatttccng  gnctngatnn  gtttcccccc  1020
cccccatttt  ccnaaacttt  ttcccancna  ggaanccncc  cttttttttng  gtcngattna  1080
ncaaccttcc  aaaccatttt  tccnnaaaaa  ntttgntngg  ngggaaaaan  acctnntttt  1140
atagan                                                                  1146
```

<210> 10
<211> 545
<212> DNA
<213> Homo sapien

<400> 10
```
cttcattggg  tacgggcccc  ctcgaggtcg  acggtatcga  taagcttgat  atcgaattcc    60
tgcagccgg  gggatccact  agttctagag  tcaggaagaa  ccaccaacct  tcctgatttt   120
tattggctct  gagttctgag  gccagttttc  ttcttctgtt  gagtatgcgg  gattgtcagg   180
cagatctggc  tgtggaaagg  agactgtggg  cagcaagttt  agaggcgtga  ctgaaagtca   240
cactgcatct  tgagctgctg  aatcagcttt  ctggttacca  cgggcaacag  ccgtgttttc   300
cttttgatgt  cctttacagt  ggattacagc  cacctgctga  ggtgagtagc  ccacgctcct   360
ggtagatggc  tccacgtaca  tgcacagtag  caaaggcgta  cctgctgtca  gtgttaacgt   420
taatatcctt  accccatcgg  agagcctgag  tgagggcgat  caattcagcc  cttttgtgct   480
gaggtgtttg  ctggttaagc  cctgaaccca  caacacatct  gtctccatgg  taacagctgc   540
accgg                                                                    545
```

<210> 11
<211> 196
<212> DNA
<213> Homo sapien

<400> 11
```
tctcctaggc  tgggcacagt  ggctcatacc  tgtaatcctg  accgtttcag  aggctcaggt    60
gggggatcg  cttgagccca  agatttcaag  actagtctgg  gtaacatagt  gagaccctat   120
ctctacgaaa  aaataaaaaa  atgagcctgg  tgtagtggca  cacaccagct  gaggagggag   180
aatcgagcct  aggaga                                                       196
```

<210> 12
<211> 388
<212> DNA
<213> Homo sapien

<220>

```
<221> misc_feature
<222> (1)...(388)
<223> n = A,T,C or G

<400> 12
tctcctaggc ttgggggctc tgactagaaa ttcaaggaac ctgggattca agtccaactg      60
tgacaccaac ttacactgtg gnctccaata aactgcttct ttcctattcc ctctctatta     120
aataaaataa ggaaaacgat gtctgtgtat agccaagtca gntatcctaa aaggagatac     180
taagtgacat taaatatcag aatgtaaaac ctgggaacca ggttcccagc ctgggattaa     240
actgacagca agaagactga acagtactac tgtgaaaagc ccgaagnggc aatatgttca     300
ctctaccgtt gaaggatggc tgggagaatg aatgctctgt cccccagtcc caagctcact     360
tactatacct cctttatagc ctaggaga                                        388


<210> 13
<211> 337
<212> DNA
<213> Homo sapien

<400> 13
tagtagttgc ctataatcat gtttctcatt attttcacat tttattaacc aatttctgtt      60
taccctgaaa aatatgaggg aaatatatga aacaggagg caatgttcag ataattgatc      120
acaagatatg atttctacat cagatgctct ttcctttcct gtttatttcc tttttatttc     180
ggttgtgggg tcgaatgtaa tagctttgtt tcaagagaga gttttggcag tttctgtagc     240
ttctgacact gctcatgtct ccaggcatct atttgcactt taggaggtgt cgtgggagac     300
tgagaggtct attttttcca tatttgggca actacta                              337


<210> 14
<211> 571
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(571)
<223> n = A,T,C or G

<400> 14
tagtagttgc catacagtgc ctttccattt atttaacccc cacctgaacg gcataaactg      60
agtgttcagc tggtgttttt tactgtaaac aataaggaga ctttgctctt catttaaacc     120
aaaatcatat ttcatatttt acgctcgagg gtttttaccg gttccttttt acactcctta     180
aaacagtttt taagtcgttt ggaacaagat attttttctt tcctggcagc ttttaacatt     240
atagcaaatt tgtgtctggg ggactgctgg tcactgtttc tcacagttgc aaatcaaggc     300
atttgcaacc aagaaaaaaa aatttttttg ttttatttga aactggaccg gataaacggt     360
gtttggagcg gctgctgtat atagttttaa atggtttatt gcacctcctt aagttgcact     420
tatgtggggg ggggnttttg natagaaagt ntttantcac anagtcacag ggacttttnt     480
cttttggnna ctgagctaaa aagggctgnt tttcgggtgg gggcagatga aggctcacag     540
gaggcctttc tcttagaggg gggaactnct a                                    571


<210> 15
<211> 548
<212> DNA
```

```
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(548)
<223> n = A,T,C or G

<400> 15
tatatattta ataacttaaa tatattttga tcacccactg gggtgataag acaatagata      60
taaaagtatt tccaaaaagc ataaaaccaa agtatcatac caaaccaaat tcatactgct     120
tcccccaccc gcactgaaac ttcaccttct aactgtctac ctaaccaaat tctacccttc     180
aagtctttgg tgcgtgctca ctactctttt tttttttttt tttnttttgg agatggagtc     240
tggctgtgca gcccaggggt ggagtacaat ggcacaacct cagctcactg naacctccgc     300
ctcccaggtt catgagattc tcctgnttca gccttcccag tagctgggac tacaggtgtg     360
catcaccatg cctggntaat cttttttngt tttngggtag agatggggggt tttacatgtt     420
ggccaggntg gtntcgaact cctgacctca agtgatccac ccacctcagg ctcccaaagt     480
gctaggatta cagacatgag ccactgngcc cagncctggt gcatgctcac ttctctaggc     540
aactacta                                                             548

<210> 16
<211> 638
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(638)
<223> n = A,T,C or G

<400> 16
ttccgttatg cacatgcaga atattctatc ggtacttcag ctattactca ttttgatggc      60
gcaatccgag cctatcctca agatgagtat ttagaaagaa ttgatttagc gatagaccaa     120
gctggtaagc actctgacta cacgaaattg ttcagatgtg atggatttat gacagttgat     180
ctttggaaga gattattaag tgattatttt aaagggaatc cattaattcc agaatatctt     240
ggtttagctc aagatgatat agaaatagaa cagaaagaga ctacaaatga agatgtatca     300
ccaactgata ttgaagagcc tatagtagaa aatgaattag ctgcatttat tagccttaca     360
catagcgatt ttcctgatga atcttatatt cagccatcga catagcatta cctgatgggc     420
aaccttacga ataatagaaa ctgggtgcgg ggctattgat gaattcatcc ncagtaaatt     480
tggatatnac aaaatataac tcgattgcat ttggatgatg gaatactaaa tctggcaaaa     540
gtaactttgg agctactagt aacctctctt tttgagatgc aaaattttct tttagggttt     600
cttattctct actttacgga tattggagca taacggga                            638

<210> 17
<211> 286
<212> DNA
<213> Homo sapien

<400> 17
actgatggat gtcgccggag gcgaggggcc ttatctgatg ctcggctgcc tgttcgtgat      60
gtgcgcggcg attgggctgt ttatctcaaa caccgccacg gcggtgctga tggcgcctat     120
tgccttagcg gcggcgaagt caatgggcgt ctcaccctat ccttttgcca tggtggtggc     180
```

```
gatggcggct tcggcggcgt ttatgacccc ggtctcctcg ccggttaaca ccctggtgct    240
tggccctggc aagtactcat ttagcgattt tgtcaaaata ggcgtg                    286
```

```
<210> 18
<211> 262
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(262)
<223> n = A,T,C or G

<400> 18
tcggtcatag cagcccccttc ttctcaattt catctgtcac taccctggtg tagtatctca    60
tagccttaca tttttatagc ctcctccctg gtctgtcttt tgattttcct gcctgtaatc    120
catatcacac ataactgcaa gtaaacattt ctaaagtgtg gttatgctca tgtcactcct    180
gtgncaagaa atagtttcca ttaccgtctt aataaaattc ggatttgttc tttnctattn    240
tcactcttca cctatgaccg aa                                             262
```

```
<210> 19
<211> 261
<212> DNA
<213> Homo sapien

<400> 19
tcggtcatag caaagccagt ggtttgagct ctctactgtg taaactccta aaccaaggcc    60
atttatgata aatggtggca ggattttat tataaacatg tacccatgca aatttcctat     120
aactctgaga tatattcttc tacatttaaa caataaaaat aatctatttt taaaagccta     180
atttgcgtag ttaggtaaga gtgtttaatg agagggtata aggtataaat caccagtcaa     240
cgtttctctg cctatgaccg a                                              261
```

```
<210> 20
<211> 294
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(294)
<223> n = A,T,C or G

<400> 20
tacaacgagg cgacgtcggt aaaatcggac atgaagccac cgctggtctt ttcgtccgag    60
cgataggcgc cggccagcca gcggaacggt tgcccggatg gcgaagcgag ccggagttct     120
tcggactgag tatgaatctt gttgtgaaaa tactcgccgc cttcgttcga cgacgtcgcg     180
tcgaaatctt cganctcctt acgatcgaag tcttcgtggg cgacgatcgc ggtcagttcc     240
gccccaccga aatcatggtt gagccggatg ctgnccccga agncctcgtt tgtn          294
```

```
<210> 21
<211> 208
```

<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(208)
<223> n = A,T,C or G

<400> 21
ttggtaaagg gcatggacgc agacgcctga cgtttggctg aaaatctttc attgattcgt   60
atcaatgaat aggaaaattc ccaaagaggg aatgtcctgt tgctcgccag tttttntgtt   120
gttctcatgg anaaggcaan gagctcttca gactattggn attntcgttc ggtcttctgc   180
caactagtcg ncttgcnang atcttcat   208

<210> 22
<211> 287
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(287)
<223> n = A,T,C or G

<400> 22
nccnttgagc tgagtgattg agatntgtaa tggttgtaag ggtgattcag gcggattagg   60
gtggcgggtc acccggcagt gggtctcccg acaggccagc aggatttggg gcaggtacgg   120
ngtgcgcatc gctcgactat atgctatggc aggcgagccg tggaaggngg atcaggtcac   180
ggcgctggag ctttccacgg tccatgnatt gngatggctg ttctaggcgg ctgttgccaa   240
gcgtgatggt acgctggctg gagcattgat ttctggtgcc aaggtgg   287

<210> 23
<211> 204
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(204)
<223> n = A,T,C or G

<400> 23
ttgggtaaag ggagcaagga gaaggcatgg agaggctcan gctggtcctg gcctacgact   60
gggccaagct gtcgccgggg atggtggaga actgaagcgg gacctcctcg aggtcctccg   120
ncgttacttc nccgtccagg aggagggtct ttccgtggtc tnggaggagc gggggggagaa   180
gatnctcctc atggtcnaca tccc   204

<210> 24
<211> 264
<212> DNA
<213> Homo sapien

```
<220>
<221> misc_feature
<222> (1)...(264)
<223> n = A,T,C or G

<400> 24
tggattggtc aggagcgggt agagtggcac cattgagggg atattcaaaa atattatttt      60
gtcctaaatg atagttgctg agtttttctt tgacccatga gttatattgg agtttatttt     120
ttaactttcc aatcgcatgg acatgttaga cttattttct gttaatgatt nctattttta     180
ttaaattgga tttgagaaat tggttnttat tatatcaatt tttggtattt gttgagtttg     240
acattatagc ttagtatgtg acca                                           264


<210> 25
<211> 376
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(376)
<223> n = A,T,C or G

<400> 25
ttacaacgag gggaaactcc gtctctacaa aaattaaaaa attagccagg tgtggtggtg      60
tgcacccgca atcccagcta cttgggaggt tgagacacaa gantcaccta natgtgggag     120
gtcaaggttg catgagtcat gattgtgcca ctgcactcca gcctgggtga cagaccgaga     180
ccctgcctca anaganaaag aataggaagt tcagaaatcn tggntgtggn gcccagcaat     240
ctgcatctat ncaacccctg caggcaangc tgatgcagcc tangttcaag agctgctgtt     300
tctggaggca gcagttnggg cttccatcca gtatcacggc cacactcgca cnagccatct     360
gtcctccgtn tgtnac                                                    376


<210> 26
<211> 372
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(372)
<223> n = A,T,C or G

<400> 26
ttacaacgag gggaaactcc gtctctacaa aaattaaaaa attagccagg tgtggtggtg      60
tgcacctgta atcccagcta cttgggcggc tgagacacaa gaaccaccta aatgtgggag     120
ggtcaaggtt gcatgagtca tgatcgcgcc actgcactcc agcctgggtg acagactgag     180
accctgcctc aaaagaaaaa gaataggaag ttcagaaacc ctgggtgtgg ngcccagcaa     240
tctgcattta acaatccct gcaggcaatg ctgatgcagc ctaagttcaa gagctgctgt      300
tctggaggca gnagtaaggg cttccatcca gcatcacggn caacactgca aaagcacctg     360
tcctcgttgg ta                                                        372
```

<210> 27
<211> 477
<212> DNA
<213> Homo sapien

<400> 27

```
ttctgtccac atctacaagt tttatttatt ttgtgggttt tcagggtgac taagtttttc        60
cctacattga aaagagaagt tgctaaaagg tgcacaggaa atcatttttt taagtgaata       120
tgataatatg ggtccgtgct taatacaact gagacatatt tgttctctgt ttttttagag       180
tcacctctta aagtccaatc ccacaatggt gaaaaaaaaa tagaaagtat ttgttctacc       240
tttaaggaga ctgcagggat tctccttgaa aacggagtat ggaatcaatc ttaaataaat       300
atgaaattgg ttggtcttct gggataagaa attcccaact cagtgtgctg aaattcacct       360
gacttttttt gggaaaaaat agtcgaaaat gtcaatttgg tccataaaat acatgttact       420
attaaaagat atttaaagac aaattctttc agagctctaa gattggtgtg gacagaa         477
```

<210> 28
<211> 438
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(438)
<223> n = A,T,C or G

<400> 28

```
tctncaacct cttgantgtc aaaaacccttn taggctatct ctaaaagctg actggtattc        60
attccagcaa aatccctcta gttttggag tttcctttta ctatctgggg ctgcctgagc       120
cacaaatgcc aaattaagag catggctatt ttcggggggct gacaggtcaa aagggggtgta     180
aatccgataa gcctcctgga ggtgctctaa aaacactcct ggtgactcat catgcccctg       240
gacgacttca atcgncttag acaagtttat aggtttctgg gcagctccct gaatacccac       300
gaggagatac cggtggaaat cgtcaaaagt tctccctcca cttgagaaat ttgggtccca       360
attaggtccc aattgggtct ctaatcacta ttcctctagc ttcctcctcc ggnctattgg       420
ttgatgtgag gttgaaga                                                     438
```

<210> 29
<211> 620
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(620)
<223> n = A,T,C or G

<400> 29

```
aagagggtac cagccccaag ccttgacaac ttccataggg tgtcaagcct gtgggtgcac        60
agaagtcaaa aattgagttt tgggatcctc agcctagatt tcagaggata taaagaaaca       120
cctaacacct agatattcag acaaaagttt actacaggga tgaagctttc acggaaaacc       180
tctactagga aagtacagaa gagaaatgtg ggtttggagc ccccaaacag aatcccctct       240
agaacactgc ctaatgaaac tgtgagaaga tggccactgt catccagaca ccagaatgat       300
```

```
agacccacca aaaacttatg ccatattgcc tataaaacct acagacactc aatgccagcc       360
ccatgaaaaa aaaactgaga agaagactgt nccctacaat gccaccggag cagaactgcc       420
ccaggccatg gaagcacagc tcttatatca atgtgacctg gatgttgaga catggaatcc       480
nangaaatcn ttttaanact tccacggttn aatgactgcc ctattanatt cngaacttan       540
atccnggcct gtgacctctt tgctttggcc attccccctt tttggaatgg ctntttttt       600
cccatgcctg tnccctctta                                                 620
```

```
        <210> 30
        <211> 100
        <212> DNA
        <213> Homo sapien


        <400> 30
ttacaacgag ggggtcaatg tcataaatgt cacaataaaa caatctcttc tttttttttt        60
tttttttttt tttttttttt tttttttttt tttttttttt                           100


        <210> 31
        <211> 762
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(762)
        <223> n = A,T,C or G


        <400> 31
tagtctatgc gccggacaga gcagaattaa attggaagtt gccctccgga ctttctaccc        60
acactcttcc tgaaaagaga aagaaaagag gcaggaaaga ggttaggatt tcattttcaa       120
gagtcagcta attaggagag cagagtttag acagcagtag gcaccccatg atacaaacca       180
tggacaaagt ccctgtttag taactgccag acatgatcct gctcaggttt tgaaatctct       240
ctgcccataa aagatggaga gcaggagtgc catccacatc aacacgtgtc caagaaagag       300
tctcagggag acaagggtat caaaaaacaa gattcttaat gggaaggaaa tcaaaccaaa       360
aaattagatt tttctctaca tatatataat atacagatat ttaacacatt attccagagg       420
tggctccagt ccttggggct tgagagatgg tgaaaacttt tgttccacat taacttctgc       480
tctcaaattc tgaagtatat cagaatggga caggcaatgt tttgctccac actggggcac       540
agacccaaat ggttctgtgc ccgaagaaga gaagcccgaa agacatgaag gatgcttaag       600
gggggttggg aaagccaaat tggtantatc ttttcctcct gcctgtgttc cngaagtctc       660
cnctgaagga attcttaaaa cccttтgtga ggaaatgccc ccttaccatg acaantggtc       720
ccattgcttt tagggngatg gaaacaccaa gggttttgat cc                        762


        <210> 32
        <211> 276
        <212> DNA
        <213> Homo sapien


        <400> 32
tagtctatgc gtgtattaac ctcccctccc tcagtaacaa ccaaagaggc aggagctgtt        60
attaccaacc ccattttaca gatgcatcaa taatgacaga gaagtgaagt gacttgcgca       120
cacaaccagt aaattggcag agtcagattt gaatccatgg agtctggtct gcactttcaa       180
tcaccgaata ccctttctaa gaaacgtgtg ctgaatgagt gcatggataa atcagtgtct       240
```

actcaacatc tttgcctaga tatcccgcat agacta   276

            `<210> 33`
            `<211> 477`
            `<212> DNA`
            `<213> Homo sapien`

            `<400> 33`

```
tagtagttgc caaatatttg aaaatttacc cagaagtgat tgaaaacttt ttggaaacaa          60
aaacaaataa agccaaaagg taaaataaaa atatctttgc actctcgtta ttacctatcc         120
ataacttttt caccgtaagc tctcctgctt gttagtgtag tgtggttata ttaaactttt         180
tagttattat tttttattca cttttccact agaaagtcat tattgattta gcacacatgt         240
tgatctcatt tcattttttc tttttatagg caaaatttga tgctatgcaa caaaaatact         300
caagcccatt atcttttttc cccccgaaat ctgaaaattg caggggacag agggaagtta         360
tcccattaaa aaattgtaaa tatgttcagt ttatgtttaa aaatgcacaa aacataagaa         420
aattgtgttt acttgagctg ctgattgtaa gcagttttat ctcagggggca actacta          477
```

            `<210> 34`
            `<211> 631`
            `<212> DNA`
            `<213> Homo sapien`

            `<400> 34`

```
tagtagttgc caattcagat gatcagaaat gctgctttcc tcagcattgt cttgttaaac          60
cgcatgccat ttggaacttt ggcagtgaga agccaaaagg aagaggtgaa tgacatatat         120
atatatatat attcaatgaa agtaaaatgt atatgctcat atactttcta gttatcagaa         180
tgagttaagc tttatgccat tgggctgctg catattttaa tcagaagata aaagaaaatc         240
tgggcatttt tagaatgtga tacatgtttt tttaaaactg ttaaatatta tttcgatatt         300
tgtctaagaa ccggaatgtt cttaaaattt actaaaacag tattgttcga ggaagagaaa         360
actgtactgt ttgccattat tacagtcgta caagtgcatg tcaagtcacc cactctctca         420
ggcatcagta tccacctcat agctttacac attttgacgg ggaatattgc agcatcctca         480
ggcctgacat ctgggaaagg ctcagatcca cctactgctc cttgctcgtt gatttgtttt         540
aaaatattgt gcctggtgtc acttttaagc cacagccctg cctaaaagcc agcagagaac         600
agaacccgca ccattctata ggcaactact a                                        631
```

            `<210> 35`
            `<211> 578`
            `<212> DNA`
            `<213> Homo sapien`

            `<400> 35`

```
tagtagttgc catcccatat tacagaaggc tctgtataca tgacttattt ggaagtgatc          60
tgttttctct ccaaacccat ttatcgtaat ttcaccagtc ttggatcaat cttggtttcc         120
actgatacca tgaaacctac ttggagcaga cattgcacag ttttctgtgg taaaaactaa         180
aggtttattt gctaagctgt catcttatgc ttagtatttt tttttacag tggggaattg         240
ctgagattac attttgttat tcattagata ctttgggata acttgacact gtcttctttt         300
tttcgctttt aattgctatc atcatgcttt tgaaacaaga acacattagt cctcaagtat         360
tacataagct tgcttgttac gcctggtggt ttaaaggact atctttggcc tcaggttcac         420
aagaatgggc aaagtgtttc cttatgttct gtagttctca ataaaagatt gccagggggcc         480
gggtactgtg gctcgcactg taatcccagc actttgggaa gctgaggctg cggatcatg          540
ttagggcagg tgttcgaaac cagcctgggc aactacta                                 578
```

```
<210> 36
<211> 583
<212> DNA
<213> Homo sapien

<400> 36
tagtagttgc ctgtaatccc agcaactcag gaggctgggg caggagaatc agttgaacct      60
gggaggcaga agttgtaatt agcaaagatc gcaccattgc acttcagcct gggcaacaag     120
agtgagattc catctcaaaa acaaaaaaaa gaaaagaaa agaaaaggaa aaaacgtata      180
aacccagcca aaacaaaatg atcattcttt taataagcaa gactaattta atgtgtttat     240
ttaatcaaag cagttgaatc ttctgagtta ttggtgaaaa tacccatgta gttaatttag     300
ggttcttact tgggtgaacg tttgatgttc acaggttata aaatggttaa caaggaaaat     360
gatgcataaa gaatcttata aactactaaa aataaataaa atataaatgg ataggtgcta     420
tggatggagt ttttgtgtaa tttaaaatct tgaagtcatt ttggatgctc attggttgtc     480
tggtaatttc cattaggaaa aggttatgat atggggaaac tgtttctgga aattgcggaa     540
tgtttctcat ctgtaaaatg ctagtatctc agggcaacta cta                      583


<210> 37
<211> 716
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(716)
<223> n = A,T,C or G

<400> 37
gatctactag tcatntggat tctatccatg gcagctaagc ctttctgaat ggattctact      60
gctttcttgt tctttaatcc agcccttat atatgtttat gttcacaggc agggcaatgt     120
ttagtgaaaa caattctaaa tttttattt tgcattttca tgctaatttc cgtcacactc      180
cagcaggctt cctgggagaa taaggagaaa tacagctaaa gacattgtcc ctgcttactt     240
acagcctaat ggtatgcaaa accacttcaa taaagtaaca ggaaaagtac taaccaggta     300
gaatggacca aaactgatat agaaaaatca gaggaagaga ggaacaaata tttactgagt     360
cctagaatgt acaaggcttt ttaattacat attttatgta aggcctgcaa aaaacaggtg     420
agtaatcaac atttgtccca ttttacatat aaggaaactg aagcttaaat tgaataattt     480
aatgcataga ttttatagtt agaccatgtt caggtcccta tgttatactt actagctgta     540
tgaatatgag aaaataattt tgttattttc ttggcatcag tattttcatc tgcaaaataa     600
agctaaagtt atttagcaaa cagtcagcat agtgcctgat acatagtagg tgctccaaac     660
atgattacnc tantattngg tattanaaaa atccaatata ggcntggata aaaccg         716


<210> 38
<211> 688
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(688)
<223> n = A,T,C or G
```

```
      <400> 38
ttctgtccac atatcatccc actttaattg ttaatcagca aaactttcaa tgaaaaatca      60
tccattttaa ccaggatcac accaggaaac tgaaggtgta ttttttttta ccttaaaaaa     120
aaaaaaaaaa accaaacaaa ccaaaacaga ttaacagcaa agagttctaa aaaatttaca     180
tttctcttac aactgtcatt cagagaacaa tagttcttaa gtctgttaaa tcttggcatt     240
aacagagaaa cttgatgaan agttgtactt ggaatattgt ggattttttt ttttgtctaa     300
tctcccccta ttgttttgcc aacagtaatt taagtttgtg tggaacatcc ccgtagttga     360
agtgtaaaca atgtatagga aggaatatat gataagatga tgcatcacat atgcattaca     420
tgtagggacc ttcacaactt catgcactca gaaaacatgc ttgaagagga ggagaggacg     480
gcccagggtc accatccagg tgccttgagg acagagaatg cagaagtggc actgttgaaa     540
tttagaagac catgtgtgaa tggtttcagg cctgggatgt ttgccaccaa gaagtgcctc     600
cgagaaattt cttttcccatt tggaatacag ggtggcttga tgggtacggt gggtgaccca     660
acgaagaaaa tgaaattctg ccctttcc                                        688
```

```
      <210> 39
      <211> 585
      <212> DNA
      <213> Homo sapien

      <220>
      <221> misc_feature
      <222> (1)...(585)
      <223> n = A,T,C or G

      <400> 39
tagtagttgc cgcnnaccta aaanttggaa agcatgatgt ctaggaaaca tantaaaata      60
gggtatgcct atgtgctaca gagagatgtt agcatttaaa gtgcatantt ttatgtattt     120
tgacaaatgc atatncctct ataatccaca actgattacg aagctattac aattaaaaag     180
tttggccggg cgtggtgggc ggtggctgac gcctgtaatc ccagcacttt gggaggccga     240
ggcacgcgga tcacgaggtc gggagttcaa gaccatcctg ctaacacgg tgaaagtcca      300
tctctactaa aaatacgaaa aaattacccc ggcgtggtgg cgggcgcctg tagtcccagc     360
tactccggag gctgaggcag gagaatggcg tgaacccagg cacggagct tgcagtgtgc      420
caacatcacg tcactgccct ccagcctggg ggacaggaac aagantcccg tcctcanaaa     480
agaaaaatac tactnatant ttcnacttta ttttaantta cacagaactn cctcttggta     540
ccccttacc attcatctca cccacctcct ataggcacn nctaa                       585
```

```
      <210> 40
      <211> 475
      <212> DNA
      <213> Homo sapien

      <400> 40
tctgtccaca ccaatcttag aagctctgaa aagaatttgt ctttaaatat cttttaatag      60
taacatgtat tttatggacc aaattgacat tttcgactgt ttttccaaa aaagtcaggt      120
gaatttcagc acactgagtt gggaatttct tatcccagaa gaccaaccaa tttcatattt     180
atttaagatt gattccatac tccgtttttca aggagaatcc ctgcagtctc cttaaaggta     240
gaacaaatac ttcctatttt ttttcacca ttgtgggatt ggactttaag aggtgactct      300
aaaaaaacag agaacaaata tgtctcagtt gtattaagca cggacccata ttatcatatt     360
cacttaaaaa aatgatttcc tgtgcacctt ttggcaactt ctcttttcaa tgtagggaa      420
aacttagtca ccctgaaaac ccacaaaata aataaaactt gtagatgtgg acaga          475
```

```
<210> 41
<211> 423
<212> DNA
<213> Homo sapien

<400> 41
taagagggta catcgggtaa gaacgtaggc acatctagag cttagagaag tctggggtag    60
gaaaaaaatc taagtattta taagggtata ggtaacattt aaaagtaggg ctagctgaca   120
ttatttagaa agaacacata cggagagata agggcaaagg actaagacca gaggaacact   180
aatatttagt gatcacttcc attcttggta aaaatagtaa cttttaagtt agcttcaagg   240
aagatttttg gccatgatta gttgtcaaaa gttagttctc ttgggtttat attactaatt   300
ttgtttttaag atccttgtta gtgctttaat aaagtcatgt tatatcaaac gctctaaaac   360
attgtagcat gttaaatgtc acaatatact taccatttgt tgtatatggc tgtaccctct   420
cta                                                                 423


<210> 42
<211> 527
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(527)
<223> n = A,T,C or G

<400> 42
tctcctaggc taatgtgtgt gtttctgtaa aagtaaaaag ttaaaaattt taaaaataga    60
aaaagctta tagaataaga atatgaagaa agaaaatatt tttgtacatt tgcacaatga   120
gtttatgttt taagctaagt gttattacaa aagagccaaa aaggttttaa aaattaaaac   180
gtttgtaaag ttacagtacc cttatgttaa tttataattg aagaaagaaa aactttttt   240
tataaatgta gtgtagccta agcatacagt atttataaag tctggcagtg ttcaataatg   300
tcctaggcct tcacattcac tcactgactc acccagagca acttccagtc ctgtaagctc   360
cattcgtggt aagtgcccta tacaggtgca ccatttattt tacagtattt ttactgtacc   420
ttctctatgt ttccatatgt ttcgatatac aaataccact ggttactatn gcccnacagg   480
taattccagt aacacggcct gtatacgtct ggtancccta gngaaga               527


<210> 43
<211> 331
<212> DNA
<213> Homo sapien

<400> 43
tcttcaacct cgtaggacaa ctctcatatg cctgggcact attttttaggt tactaccttg    60
gctgcccttc tttaagaaaa aaaaagaag aaaaaagaac ttttccacaa gtttctcttc   120
ctctagttgg aaaattagag aaatcatgtt tttaattttg tgttatttca gatcacaaat   180
tcaaacactt gtaaacatta agcttctgtt caatcccctg ggaagaggat tcattctgat   240
atttacggtt caaagaagt tgtaatattg tgcttggaac acagagaacc agttattaac   300
ttcctactac tattatataa taaataataa c                                 331


<210> 44
```

<211> 592
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(592)
<223> n = A,T,C or G

<400> 44
ggcttagtag ttgccaggca aaatarcgtt gattctcctc aggagccacc cccaacaccc   60
ctgtttgctt ctagacctat acctagacta aagtcccagc agacccctag aggtgaggtt   120
cagagtgacc cttgaggaga tgtgctacac tagaaaagaa ctgcttgagt tttctaattt   180
atataagcag aaatctggag aagagtcata ggaatggata ttaagggtgt gagataatgg   240
cggaaggaat atagagttgg atcaggctgg acttattgat ttgaacccac taagtagaga   300
ttctgctttt gatgttgcag ctcaggagt taaaaaaggt tttaatggtt ctaatagttt   360
atttgcttgg ttagctgaaa tatggataaa agatggccca ctgtgagcaa gctggaaatg   420
cctgatctct ctcagtttaa tgtagaggaa gggatccaaa agtttaggga ganttggatg   480
ctggraktgg attggtcact ttgrgaccta cccwtcccag ctgggagggt ccagaagata   540
cacccttgac caacgctttg cgaaatggat ttgtgatggc ggcaactact aa   592

<210> 45
<211> 567
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(567)
<223> n = A,T,C or G

<400> 45
ggcttagtag ttgccattgc gagtgcttgc tcaacgagcg ttgaacatgg cggattgtct   60
agattcaacg gatttgagtt ttaccagcaa agcgaaccaa gcgcggccca gagaattatg   120
ggttggttgg ctttgaaaag atggaaatcc tgtaggccta gtcagaaaag ccttcttgca   180
gaacagttgg ttctcgggcg aacgctcatc aagatgccca ttggaaaggc tagcgtgtat   240
ttgggagagc ctgatagcgt gtcttctgat gatgtttgtg cttggacagt gacaaaagat   300
atgcaaagca agtccgaact agacgtcaag cttcgtgagc aaattattgt agactcctac   360
ttatactgtg aggaatgata gccaagggtg gggactttaa gactaaggtg gtttgtactt   420
gcgccgatga tcccaggcag aaagamctga tcgctagttt tatacgggca actactaagc   480
cgaattccag cacactggcg gccgttacta attggatccg anctcggtac cagcttgatg   540
catascttga gttwtctata ntgtcnc   567

<210> 46
<211> 908
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(908)

19

```
<223> n = A,T,C or G

<400> 46
gagcgaaaga ccgagggcag ngnntangng cgangaagcg gagagggcca aaaagcaacc      60
gctttccccg gggggtgccg attcattaag gcaggtggag gacaggtttc ccgatggaag     120
gcggcagggg cgcaagcaat taatgtgagt aggccattca ttagcacccg ggcttaacat     180
ttaagcttcg ggttggtatg tggtgggaat tgtgagcgga taacaatttc acacaggaaa     240
cagctatgac catgattacg ccaagctatt taggtgacat tatagaataa ctcaagttat     300
gcatcaagct tggtaccgag ttcggatcca ctagtaacgg ccgccagtgt gtggaattcg     360
gcttagtagt tgccgaccat ggagtgctac ctaggctaga atacctgagy tcctccctag     420
cctcactcac attaaattgt atcttttcta cattagatgt cctcagcgcc ttatttctgc     480
tggacwatcg ataaattaat cctgatagga tgatagcagc agattaatta ctgagagtat     540
gttaatgtgt catccctcct atataacgta tttgcatttt aatggagcaa ttctggagat     600
aatccctgaa ggcaaaggaa tgaatcttga gggtgagaaa gccagaatca gtgtccagct     660
gcagttgtgg gagaaggtga tattatgtat gtctcagaag tgacaccata tgggcaacta     720
ctaagcccga attccagcac actggcgggc gttactaatg gatccgagct cggtaccaag     780
cttgatgcat agcttgagta tctatagtgt cactaaatag cctggcgtta tcatggtcat     840
agctgtttcc tgtgtgaaat tgttatccgc tcccaattcc ccccaccata cgagccggaa     900
cataaagt                                                               908

    <210> 47
    <211> 480
    <212> DNA
    <213> Homo sapien

    <220>
    <221> misc_feature
    <222> (1)...(480)
    <223> n = A,T,C or G

<400> 47
tgccaacaag gaaagtttta aatttcccct tgaggattct tggtgatcat caaattcagt      60
ggttttttaag gttgttttct gtcaaataac tctaacttta agccaaacag tatatggaag    120
cacagataka atattacaca gataaaagag gagttgatct aaagtaraga tagttggggg     180
ctttaatttc tggaacctag gtctccccat cttcttctgt gctgaggaac ttcttggaag     240
cggggattct aaagttcttt ggaagacagt ttgaaaacca ccatgttgtt ctcagtacct     300
ttattttaa aaagtaggtg aacattttga gagagaaaag ggcttggttg agatgaagtc      360
ccccccccccc ctttttttttt ttttagctga aatagatacc ctatgttnaa rgaarggatt   420
attatttacc atgccaytar scacatgctc tttgatgggc nyctccstac cctccttaag     480

    <210> 48
    <211> 591
    <212> DNA
    <213> Homo sapien

<400> 48
aagagggtac cgagtggaat ttccgcttca ctagtctggt gtggctagtc ggtttcgtgg      60
tggccaacat tacgaacttc caactcaacc gttcttggac gttcaagcgg gagtaccggc     120
gaggatggtg gcgtgaattc tggcctttct ttgccgtggg atcggtagcc gccatcatcg     180
gtatgtttat caagatcttc tttactaacc cgacctctcc gatttacctg cccgagccgt     240
ggtttaacga ggggaggggg atccagtcac gcgagtactg gtcccagatc ttcgccatcg     300
```

```
tcgtgacaat gcctatcaac ttcgtcgtca ataagttgtg gaccttccga acggtgaagc      360
actccgaaaa cgtccggtgg ctgctgtgcg gtgactccca aaatcttgat aacaacaagg      420
taaccgaatc gcgctaagga accccggcat ctcgggtact ctgcatatgc gtaccccctta     480
agccgaattc cagcacactg gcggccgtta ctaattggat ccgaactccg taaccaagcc      540
tgatgcgtaa cttgagttat tctatagtgt ccctaaaata acctggcgtt a               591
```

```
      <210> 49
      <211> 454
      <212> DNA
      <213> Homo sapien


      <400> 49
aagagggtac ctgccttgaa atttaaatgt ctaaggaaar tgggagatga ttaagagttg       60
gtgtggcyta gtcacaccaa aatgtattta ttacatcctg ctcctttcta gttgacagga      120
aagaaagctg ctgtggggaa aggagggata aatactgaag ggatttacta aacaaatgtc      180
catcacagag ttttccttttt ttttttttttg agacagagtc ttgctctgtc acccaggctg    240
gaatgaagwg gtatgatctc agttgaatgc aacctctacc tcctaggttc aagcgattct      300
catgcctcag cctcctgagc agctgggact ataggcgcat gctaccatgc caggctaatt      360
tttatatttt tattagagac ggggtgttgc catgttggcc aggcaggtct cgaactcctg      420
ggcctcagat gatctgcccc accgtaccct ctta                                  454
```

```
      <210> 50
      <211> 463
      <212> DNA
      <213> Homo sapien


      <400> 50
aagagggtac caaaaaaaag aaaaaggaaa aaaagaaaaa caacttgtat aaggctttct       60
gctgcataca gcttttttttt tttaaataaa tggtgccaac aaatgttttt gcattcacac      120
caattgctgg ttttgaaatc gtactcttca aaggtatttg tgcagatcaa tccaatagtg      180
atgccccgta ggttttgtgg actgcccacg ttgtctacct tctcatgtag gagccattga      240
gagactgttt ggacatgcct gtgttcatgt agccgtgatg tccggggggcc gtgtacatca     300
tgttaccgtg gggtggggtc tgcattggct gctgggcata tggctgggtg cccatcatgc      360
ccatctgcat ctgcataggg tattggggcg tttgatccat atagccatga ttgctgtggt      420
agccactgtt catcattggc tgggacatgc tgttaccctc tta                        463
```

```
      <210> 51
      <211> 399
      <212> DNA
      <213> Homo sapien


      <400> 51
cttcaacctc ccaaagtgct gggattacag gactgagcca ccacgctcag cctaagcctc       60
tttttcacta ccctctaagc gatctaccac agtgatgagg ggctaaagag cagtgcaatt      120
tgattacaat aatggaactt agatttatta attaacaatt tttccttagc atgttggttc      180
cataattatt aagagtatgg acttacttag aaatgagctt tcattttaag aatttcatct      240
ttgaccttct ctattagtct gagcagtatg acactatacg tattttatt aactaaccta       300
ccttgagcta ttacttttta aaaggctata tacatgaatg tgtattgtca actgtaaagc      360
cccacagtat ttaattatat catgatgtct ttgaggttg                             399
```

```
      <210> 52
```

<211> 392
<212> DNA
<213> Homo sapien

<400> 52
cttcaacctc aatcaacctt ggtaattgat aaaatcatca cttaactttc tgatataatg   60
gcaataatta tctgagaaaa aaaagtggtg aaagattaaa cttgcatttc tctcagaatc   120
ttgaaggata tttgaataat tcaaaagcgg aatcagtagt atcagccgaa gaaactcact   180
tagctagaac gttggaccca tggatctaag tccctgccct tccactaacc agctgattgg   240
ttttgtgtaa acctcctaca cgcttgggct tggtcgcctc atttgtcaaa gtaaaggctg   300
aaataggaag ataatgaacc gtgtcttttt ggtctctttt ccatccatta ctctgatttt   360
acaaagaggc ctgtattccc ctggtgaggt tg   392

<210> 53
<211> 179
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(179)
<223> n = A,T,C or G

<400> 53
ttcgggtgat gcctcctcag gctacagtga agactggatt acagaaaggt gccagcgaga   60
tttcagattc ctgtaaacct ctaaagaaaa ggagtcgcgc ctcaactgat gtagaaatga   120
ctagttcagc atacngagac acntctgact ccgattctag aggactgagt gacctgcan   179

<210> 54
<211> 112
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(112)
<223> n = A,T,C or G

<400> 54
ttcgggtgat gcctcctcag gctacatcat natagaagca aagtagaana atcnngtttg   60
tgcattttcc cacanacaaa attcaaatga ntggaagaaa ttggganagt at   112

<210> 55
<211> 225
<212> DNA
<213> Homo sapien

<400> 55
tgagcttccg cttctgacaa ctcaatagat aatcaaagga caactttaac agggattcac   60
aaaggagtat atccaaatgc caataaacat ataaaaagga attcagcttc atcatcatca   120
gaagwatgca aattaaaacc ataatgagaa accactatgt cccactagaa tagataaaat   180

cttaaaagac tggtaaaacc aagtgttggt aaggcaagag gagca   225

<210> 56
<211> 175
<212> DNA
<213> Homo sapien

<400> 56
gctcctcttg ccttaccaac acattctcaa aaacctgtta gagtcctaag cattctcctg   60
ttagtattgg gattttaccc ctgtcctata aagatgttat gtaccaaaaa tgaagtggag   120
ggccataccc tgagggaggg gagggatctc tagtgttgtc agaagcggaa gctca   175

<210> 57
<211> 223
<212> DNA
<213> Homo sapien

<400> 57
agccatttac cacccatgga tgaatggatt ttgtaattct agctgttgta ttttgtgaat   60
ttgttaattt tgttgttttt ctgtgaaaca catacattgg atatgggagg taaaggagtg   120
tcccagttgc tcctggtcac tccctttata gccattactg tcttgtttct tgtaactcag   180
gttaggtttt ggtctctctt gctccactgc aaaaaaaaaa aaa   223

<210> 58
<211> 211
<212> DNA
<213> Homo sapien

<400> 58
gttcgaaggt gaacgtgtag gtagcggatc tcacaactgg ggaactgtca aagacgaatt   60
aactgacttg gatcaatcaa atgtgactga ggaaacacct gaaggtgaag aacatcatcc   120
agtggcagac actgaaaata aggagaatga agttgaagag gtaaaagagg agggtccaaa   180
agagatgact ttggatgggt ggtaaatggc t   211

<210> 59
<211> 208
<212> DNA
<213> Homo sapien

<400> 59
gctcctcttg ccttaccaac tttgcaccca tcatcaacca tgtggccagg tttgcagccc   60
aggctgcaca tcaggggact gcctcgcaat acttcatgct gttgctgctg actgatggtg
120ctgtgacgga tgtggaagcc acacgtgagg ctgtggtgcg tgcctcgaac ctgcccatgt   180
cagtgatcat tatgggtggt aaatggct   208

<210> 60
<211> 171
<212> DNA
<213> Homo sapien

<400> 60

```
agccatttac cacccatact aaattctagt tcaaactcca acttcttcca taaaacatct      60
aaccactgac accagttggc aatagcttct tccttcttta acctcttaga gtatttatgg     120
tcaatgccac acatttctgc aactgaataa agttggtaag gcaagaggag c              171
```

```
<210> 61
<211> 134
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(134)
<223> n = A,T,C or G

<400> 61
```

```
cgggtgatgc ctcctcaggc tttggtgtgt ccactcnact cactggcctc ttctccagca      60
actggtgaan atgtcctcan gaaaancncc acacgcngct cagggtgggg tgggaancat     120
canaatcatc nggc                                                       134
```

```
<210> 62
<211> 145
<212> DNA
<213> Homo sapien

<400> 62
```

```
agagggtaca tatgcaacag tatataaagg aagaagtgca ctgagaggaa cttcatcaag      60
gccatttaat caataagtga tagagtcaag gctcaaccca ggtgtgacgg attccaggtc     120
ccaagctcct tactggtacc ctctt                                          145
```

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<210> 63
<211> 297
<212> DNA
<213> Homo sapien

<400> 63
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tgcactgaga ggaattcaaa gggtttatgc caaagaacaa accagtcctc tgcagcctaa      60
ctcatttgtt tttgggctgc gaagccatgt agagggcgat caggcagtag atggtccctc     120
ccacagtcag cgccatggtg gtccggtaaa gcatttggtc aggcaggcct cgtttcaggt     180
agacgggcac acatcagctt tctggaaaaa cttttgtagc tctggagctt tgtttttccc     240
agcataatca tacactgtgg aatcggaggt cagtttagtt ggtaaggcaa gaggagc       297
```

```
<210> 64
<211> 300
<212> DNA
<213> Homo sapien

<400> 64
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gcactgagag gaacttccaa tactatgttg aataggagtg gtgagagagg gcatccttgt      60
cttgtgccgg ttttcaaagg gaatgcttcc agcttttgcc cattcagtat aatattaaag     120
aatgttttac cattttctgt cttgcctgtt tttctgtgtt tttgttggtc tcttcattct     180
ccattttttag gcctttacat gttaggaata tatttctttt aatgatactt cacctttggt     240
```

atcttttgtg agactctact catagtgtga taagcactgg gttggtaagg caagaggagc   300

            <210> 65
            <211> 203
            <212> DNA
            <213> Homo sapien

            <400> 65
gctcctcttg ccttaccaac tcacccagta tgtcagcaat tttatcrgct ttacctacga   60
aacagcctgt atccaaacac ttaacacact cacctgaaaa gttcaggcaa caatcgcctt   120
ctcatgggtc tctctgctcc agttctgaac ctttctcttt tcctagaaca tgcatttarg   180
tcgatagaag ttcctctcag tgc   203

            <210> 66
            <211> 344
            <212> DNA
            <213> Homo sapien

            <400> 66
tacggggacc cctgcattga gaaagcgaga ctcactctga agctgaaatg ctgttgccct   60
tgcagtgctg gtagcaggag ttctgtgctt tgtgggctaa ggctcctgga tgacccctga   120
catggagaag gcagagttgt gtgccccttc tcatggcctc gtcaaggcat catggactgc   180
cacacacaaa atgccgtttt tattaacgac atgaaattga aggagagaac acaattcact   240
gatgtggctc gtaaccatgg atatggtcac atacagaggt gtgattatgt aaaggttaat   300
tccacccacc tcatgtggaa actagcctca atgcaggggt ccca   344

            <210> 67
            <211> 157
            <212> DNA
            <213> Homo sapien

            <400> 67
gcactgagag gaacttcgta gggaggttga actggctgct gaggaggggg aacaacaggg   60
taaccagact gatagccatt ggatggataa tatggtggtt gaggagggac actacttata   120
gcagagggtt gtgtatagcc tgaggaggca tcacccg   157

            <210> 68
            <211> 137
            <212> DNA
            <213> Homo sapien

            <400> 68
gcactgagag gaacttctag aaagtgaaag tctagacata aaataaaata aaaatttaaa   60
actcaggaga gacagcccag cacggtggct cacgcctgta atcccagaac tttgggagcc   120
tgaggaggca tcacccg   137

            <210> 69
            <211> 137
            <212> DNA
            <213> Homo sapien

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        <400> 69
cgggtgatgc ctcctcaggc tgtattttga agactatcga ctggacttct tatcaactga    60
agaatccgtt aaaaatacca gttgtattat ttctacctgt caaaatccat ttcaaatgtt   120
gaagttcctc tcagtgc                                                  137


        <210> 70
        <211> 220
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(220)
        <223> n = A,T,C or G


        <400> 70
agcatgttga gcccagacac gcaatctgaa tgagtgtgca cctcaagtaa atgtctacac    60
gctgcctggt ctgacatggc acaccatcnc gtggagggca casctctgct cngcctacwa   120
cgagggcant ctcatwgaca ggttccaccc accaaactgc aagaggctca nnaagtactr   180
ccagggtmya sggacmasgg tgggaytyca ycacwcatct                         220


        <210> 71
        <211> 353
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(353)
        <223> n = A,T,C or G


        <400> 71
cgttagggtc tctatccact gctaaaccat acacctgggt aaacagggac catttaacat    60
tcccanctaa atatgccaag tgacttcaca tgtttatctt aaagatgtcc aaaacgcaac   120
tgattttctc ccctaaacct gtgatggtgg gatgattaan cctgagtggt ctacagcaag   180
ttaagtgcaa ggtgctaaat gaangtgacc tgagatacag catctacaag gcagtacctc   240
tcaacncagg gcaactttgc ttctcanagg gcatttagca gtgtctgaag taatttctgt   300
attacaactc acggggcggg gggtgaatat ctantggana gnagaccctc acg          353


        <210> 72
        <211> 343
        <212> DNA
        <213> Homo sapien


        <400> 72
gcactgagag gaacttccaa tacyatkatc agagtgaaca rgcarccyac agaacaggag    60
aaaatgttyg caatctctcc atctgacaaa aggctaatat ccagawtcta awaggaactt   120
aaacaaattt atgagaaaag aacaracaac ctcawcaaaa agtgggtgaa ggawatgcts   180
aaargaagac atytattcag ccagtaaaca yatgaaaaaa aggctcatsa tcactgawca   240
ttagagaaat gcaaatcaaa accacaatga gataccatct yayrccagtt agaayggtga   300
tcattaaaar stcaggaaac aacagatgct ggacaaggtg tca                     343
```

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<210> 73
<211> 321
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(321)
<223> n = A,T,C or G

<400> 73
gcactgagag gaacttcaga gagagagaga gagttccacc ctgtacttgg ggagagaaac        60
agaaggtgag aaagtctttg gttctgaagc agcttctaag atcttttcat ttgcttcatt       120
tcaaagttcc catgctgcca aagtgccatc ctttggggta ctgttttctg agctccagtg       180
ataactcatt tatacaaggg agatacccag aaaaaaagtg agcaaatctt aaaaaggtgg       240
cttgagttca gccttaaata ccatcttgaa atgacacaga gaaagaanga tgttgggtgg       300
gagtggatag agaccctaac g                                                  321


<210> 74
<211> 321
<212> DNA
<213> Homo sapien

<400> 74
gcactgagag gaacttcaga gagagagaga gagttccacc ctgtacttgg ggagagaaac        60
agaaggtgag aaagtctttg gttctgaagc agcttctaag atcttttcat ttgcttcatt       120
tcaaagttcc catgctgcca aagtgccatc ctttggggta ctgttttctg agctccagtg       180
ataactcatt tatacaaggg agatacccag aaaaaaagtg agcaaatctt aaaaaggtgg       240
cttgagttca gycttaaata ccatcttgaa atgamacaga gaaagaagga tgttgggtgg       300
gagtggatag agaccctaac g                                                  321


<210> 75
<211> 317
<212> DNA
<213> Homo sapien

<400> 75
gcactgagag gaacttccac atgcactgag aaatgcatgt tcacaaggac tgaagtctgg        60
aactcagttt ctcagttcca atcctgattc aggtgtttac cagctacaca accttaagca       120
agtcagataa ccttagcttc ctcatatgca aaatgagaat gaaaagtact catcgctgaa       180
ttgttttgag gattagaaaa acatctggca tgcagtagaa attcaattag tattcatttt       240
cattcttcta aattaaacaa ataggatttt tagtggtgga acttcagaca ccagaaatgg       300
gagtggatag agaccct                                                       317


<210> 76
<211> 244
<212> DNA
<213> Homo sapien

<400> 76
```

```
cgttagggtc tctatccact cccactactg atcaaactct atttatttaa ttatttttat      60
catactttaa gttctgggat acacgtgcag catgcgcagg tttgttgcat aggtatacac     120
ttgccatggt ggtttgctgc acccatcagt ccatcatcta cattaggtat ttctcctaat     180
gctatccctc ccctagcccc ttacacccccc aacaggctct agtgtgtgaa gttcctctca     240
gtgc                                                                  244
```

```
        <210> 77
        <211> 254
        <212> DNA
        <213> Homo sapien

        <400> 77
cgttagggtc tctatccact gaaatctgaa gcacaggagg aagagaagca gtyctagtga      60
gatggcaagt tcwtttacca cactctttaa catttygttt agttttaacc tttatttatg     120
gataataaag gttaatatta ataatgattt attttaaggc attcccraat ttgcataatt     180
ctccttttgg agatacccctt ttatctccag tgcaagtctg gatcaaagtg atasamagaa    240
gttcctctca gtgc                                                       254
```

```
        <210> 78
        <211> 355
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(355)
        <223> n = A,T,C or G

        <400> 78
ttcgatacag gcaaacatga actgcaggag ggtggtgacg atcatgatgt tgccgatggt      60
ccggatggnc acgaagacgc actggancac gtgcttacgt cctttttgctc tgttgatggc    120
cctgagggga cgcaggaccc ttatgacccct cagaatcttc acaacgggag atggcactgg    180
attgantccc antgacacca gagacacccc aaccaccagn atatcantat attgatgtag     240
ttcctgtaga nggccccctt gtggaggaaa gctccatnag ttggtcatct tcaacaggat     300
ctcaacagtt tccgatggct gtgatgggca tagtcatant taaccntgtn tcgaa          355
```

```
        <210> 79
        <211> 406
        <212> DNA
        <213> Homo sapien

        <400> 79
taagagggta ccagcagaaa ggttagtatc atcagatagc atcttatacg agtaatatgc      60
ctgctatttg aagtgtaatt gagaaggaaa attttagcgt gctcactgac ctgcctgtag     120
ccccagtgac agctaggatg tgcattctcc agccatcaag agactgagtc aagttgttcc     180
ttaagtcaga acagcagact cagctctgac attctgattc gaatgacact gttcaggaat     240
cggaatcctg tcgattagac tggacagctt gtggcaagtg aatttgcctg taacaagcca     300
gattttttaa aatttatatt gtaaataatg tgtgtgtgtg tgtgtgtata tatatatata     360
tgtacagtta tctaagttaa tttaaaagtt gtttggtacc ctctta                    406
```

```
        <210> 80
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```
<211> 327
<212> DNA
<213> Homo sapien

<400> 80
tttttttttt tttactcggc tcagtctaat ccttttttgta gtcactcata ggccagactt      60
agggctagga tgatgattaa taagagggat gacataacta ttagtggcag gttagttgtt     120
tgtagggctc atggtagggg taaaaggagg gcaatttcta gatcaaataa taagaaggta     180
atagctacta agaagaattt tatggagaaa gggacgcggg cggggggatat agggtcgaag    240
ccgcactcgt aaggggtgga tttttctatg tagccgttga gttgtggtag tcaaaatgta     300
ataattatta gtagtaagcc taggaga                                          327

<210> 81
<211> 318
<212> DNA
<213> Homo sapien

<400> 81
tagtctatgc ggttgattcg gcaatccatt atttgctgga ttttgtcatg tgttttgcca      60
attgcattca taatttatta tgcatttatg cttgtatctc ctaagtcatg gtatataatc     120
catgcttttt atgttttgtc tgacataaac tcttatcaga gccctttgca cacagggatt     180
caataaatat taacacagtc tacatttatt tggtgaatat tgcatatctg ctgtactgaa     240
agcacattaa gtaacaaagg caagtgagaa gaatgaaaag cactactcac aacagttatc     300
atgattgcgc atagacta                                                    318

<210> 82
<211> 338
<212> DNA
<213> Homo sapien

<400> 82
tcttcaacct ctactcccac taatagcttt ttgatgactt ctagcaagcc tcgctaacct      60
cgccttaccc cccactatta acctactggg agaactctct gtgctagtaa ccacgttctc     120
ctgatcaaat atcactctcc tacttacagg actcaacata ctagtcacag ccctatactc     180
cctctacata tttaccacaa cacaatgggg ctcactcacc caccacatta acaacataaa     240
accctcattc acgacgagaaa acaccctcat gttcatacac ctatcccca ttctcctcct     300
atccctcaac cccgacatca ttaccgggtt ttcctctt                              338

<210> 83
<211> 111
<212> DNA
<213> Homo sapien

<400> 83
agccatttac cacccatcca caaaaaaaaa aaaaaaaag aaaaatatca aggaataaaa        60
atagactttg aacaaaaagg aacatttgct ggcctgagga ggcatcaccc g               111

<210> 84
<211> 224
<212> DNA
<213> Homo sapien
```

<400> 84

```
tcgggtgatg cctcctcagg ccaagaagat aaagcttcag acccctaaca catttccaaa      60
aaggaagaaa ggagaaaaaa gggcatcatc cccgttccga agggtcaggg aggaggaaat     120
tgaggtggat tcacgagttg cggacaactc ctttgatgcc aagcgaggtg cagccggaga     180
ctggggagag cgagccaatc aggttttgaa gttcctctca gtgc                      224
```

<210> 85
<211> 348
<212> DNA
<213> Homo sapien

<400> 85

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gcactgagag gaacttcgtt ggaaacgggt ttttttcatg taaggctaga cagaagaatt      60
ctcagtaact tccttgtgtt gtgtgtattc aactcacasa gttgaacgat cctttacaca     120
gagcagactt gtaacactct twttgtggaa tttgcaagtg gagatttcag scgctttgaa     180
gtsaaaggta gaaaaggaaa tatcttccta taaaaactag acagaatgat tctcagaaac     240
tcctttgtga tgtgtgcgtt caactcacag agtttaacct ttcwttttcat agaagcagtt     300
aggaaacact ctgtttgtaa agtctgcaag tggatagaga ccctaacg                  348
```

<210> 86
<211> 293
<212> DNA
<213> Homo sapien

<400> 86

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gcactgagag gaacttcytt gtgwtgtktg yattcaactc acagagttga asswtsmttt      60
acabagwkca ggcttkcaaa cactcttttt gtmgaatytg caagwggaka tttsrrccrc     120
tttgwggycw wysktmgaaw mggrwatatc ttcwyatmra amctagacag aaksattctc     180
akaawstyyy ytgtgawgws tgcrttcaac tcacagagkt kaacmwtyct kytsatrgag     240
cagttwkgaa actctmtttc tttggattct gcaagtggat agagaccta acg             293
```

<210> 87
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 87

```
ctcctaggct                                                             10
```

<210> 88
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

```
      <400> 88
agtagttgcc                                                             10


      <210> 89
      <211> 11
      <212> DNA
      <213> Artificial Sequence

      <220>
      <223> Primer for amplification from breast tumor cDNA

      <400> 89
ttccgttatg c                                                           11


      <210> 90
      <211> 10
      <212> DNA
      <213> Artificial Sequence

      <220>
      <223> Primer for amplification from breast tumor cDNA

      <400> 90
tggtaaaggg                                                             10


      <210> 91
      <211> 10
      <212> DNA
      <213> Artificial Sequence

      <220>
      <223> Primer for amplification from breast tumor cDNA

      <400> 91
tcggtcatag                                                             10


      <210> 92
      <211> 10
      <212> DNA
      <213> Artificial Sequence

      <220>
      <223> Primer for amplification from breast tumor cDNA

      <400> 92
tacaacgagg                                                             10


      <210> 93
      <211> 10
      <212> DNA
      <213> Artificial Sequence
```

```
<220>
<223> Primer for amplification from breast tumor cDNA

<400> 93
tggattggtc                                                              10


<210> 94
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 94
ctttctaccc                                                              10


<210> 95
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 95
ttttggctcc                                                              10


<210> 96
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 96
ggaaccaatc                                                              10


<210> 97
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 97
tcgatacagg                                                              10
```

```
<210> 98
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 98
ggtactaagg                                                          10


<210> 99
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 99
agtctatgcg                                                          10


<210> 100
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 100
ctatccatgg                                                          10


<210> 101
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 101
tctgtccaca                                                          10


<210> 102
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA
```

```
       <400> 102
aagagggtac                                                    10


       <210> 103
       <211> 10
       <212> DNA
       <213> Artificial Sequence

       <220>
       <223> Primer for amplification from breast tumor cDNA

       <400> 103
cttcaacctc                                                    10


       <210> 104
       <211> 20
       <212> DNA
       <213> Artificial Sequence

       <220>
       <223> Primer for amplification from breast tumor cDNA

       <400> 104
gctcctcttg ccttaccaac                                         20


       <210> 105
       <211> 20
       <212> DNA
       <213> Artificial Sequence

       <220>
       <223> Primer for amplification from breast tumor cDNA

       <400> 105
gtaagtcgag cagtgtgatg                                         20


       <210> 106
       <211> 20
       <212> DNA
       <213> Artificial Sequence

       <220>
       <223> Primer for amplification from breast tumor cDNA

       <400> 106
gtaagtcgag cagtctgatg                                         20


       <210> 107
       <211> 20
       <212> DNA
```

<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 107
gacttagtgg aaagaatgta   20

<210> 108
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 108
gtaattccgc caaccgtagt   20

<210> 109
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 109
atggttgatc gatagtggaa   20

<210> 110
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 110
acggggaccc ctgcattgag   20

<210> 111
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 111
tattctagac cattcgctac   20

```
<210> 112
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 112
acataaccac tttagcgttc                                              20

<210> 113
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 113
cgggtgatgc ctcctcaggc                                              20

<210> 114
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 114
agcatgttga gcccagacac                                              20

<210> 115
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 115
gacaccttgt ccagcatctg                                              20

<210> 116
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
```

<223> Primer for amplification from breast tumor cDNA

<400> 116
tacgctgcaa cactgtggag   20

<210> 117
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 117
cgttagggtc tctatccact   20

<210> 118
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 118
agactgactc atgtcccta   20

<210> 119
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 119
tcatcgctcg gtgactcaag   20

<210> 120
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 120
caagattcca taggctgacc   20

<210> 121
<211> 20

<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 121
acgtactggt cttgaaggtc   20

<210> 122
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 122
gacgcttggc cacttgacac   20

<210> 123
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 123
gtatcgacgt agtggtctcc   20

<210> 124
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 124
tagtgacatt acgacgctgg   20

<210> 125
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer for amplification from breast tumor cDNA

<400> 125

cgggtgatgc ctcctcaggc   20

        <210> 126
        <211> 23
        <212> DNA
        <213> Artificial Sequence

        <220>
        <223> Primer for amplification from breast tumor cDNA

        <400> 126
atggctattt tcgggggctg aca   23

        <210> 127
        <211> 22
        <212> DNA
        <213> Artificial Sequence

        <220>
        <223> Primer for amplification from breast tumor cDNA

        <400> 127
ccggtatctc ctcgtgggta tt   22

        <210> 128
        <211> 18
        <212> DNA
        <213> Artificial Sequence

        <220>
        <223> Primer for amplification from breast tumor cDNA

        <400> 128
ctgcctgagc cacaaatg   18

        <210> 129
        <211> 24
        <212> DNA
        <213> Artificial Sequence

        <220>
        <223> Primer for amplification from breast tumor cDNA

        <400> 129
ccggaggagg aagctagagg aata   24

        <210> 130
        <211> 14
        <212> DNA
        <213> Artificial Sequence

```
        <220>
        <223> Primer

        <400> 130
tttttttttt ttag                                                    14

        <210> 131
        <211> 18
        <212> PRT
        <213> Artificial Sequence

        <220>
        <223> Predicited Th Motifs (B-cell epitopes)

        <400> 131
Ser Ser Gly Gly Arg Thr Phe Asp Asp Phe His Arg Tyr Leu Leu Val
1               5                   10                  15
Gly Ile


        <210> 132
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        <221> VARIANT
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        <220>
        <223> Predicited Th Motifs (B-cell epitopes)

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<211> 9
<212> PRT
<213> Artificial Sequence

<220>
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<210> 135
<211> 9
<212> PRT
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<220>
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<400> 135
Gly Ala Ala Gln Lys Pro Ile Asn Leu
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<210> 136
<211> 9
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<220>
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<221> VARIANT
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<223> Xaa = Any Amino Acid

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<211> 9
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<211> 9
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<220>
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<210> 139
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<220>
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<400> 139
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<210> 140
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<220>
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<212> DNA
<213> Homo sapien

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<211> 111
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atgtcagcaa agccgttctg cangaccagc tgccccgtgt gctgtgccat ctcactggcc   420
tccaccgcgt acaccgctct aggccgcgca tantgtgcac agaanaaatg atgatccagt   480
cccacagccc acgtccaaga ngactttatc cgtcagggat tctttattct gcaggatgac   540
ctgtggtatt aattgttcgt gtctgggctc aacatgcta                          579
```

<210> 148
<211> 249
<212> DNA
<213> Homo sapien

<400> 148

```
tgacaccttg tccagcatct gcaagccagg aagagagtcc tcaccaagat ccccacccCG    60
ttggcaccag gatcttggac ttccaatctc cagaactgtg agaaataagt atttgtcgct   120
aaataaatct ttgtggtttc agatatttag ctatagcaga tcaggctgac taagagaaac   180
cccataagag ttacatactc attaatctcc gtctctatcc ccaggtctca gatgctggac   240
aaggtgtca                                                           249
```

<210> 149
<211> 255
<212> DNA
<213> Homo sapien

<400> 149
```
tgacaccttg tccagcatct gctattttgt gactttttaa taatagccat tctgactggt      60
gtgagatggt aactcattgt gggtttggtc tgcatttctc taatgatcag tgatattaag     120
ctttttttaa atatgcttgt tgaccacatg tatatcatct tttgagaagt gtctgttcat     180
atcctttgcc cacttttttaa ttttttttatc ttgtaaattt gtttaatttc cttacagatg     240
ctggacaagg tgtca                                                       255
```

<210> 150
<211> 318
<212> DNA
<213> Homo sapien

<400> 150
```
ttacgctgca acactgtgga ggccaagctg ggatcacttc ttcattctaa ctggagagga      60
gggaagttca agtccagcag agggtgggtg ggtagacagt ggcactcaga aatgtcagct     120
ggaccccgt ccccgcatag gcaggacagc aaggctgtgg ctctccaggg ccagctgaag     180
aacaggacac tgtctccgct gccacaaagc gtcagagact cccatctttg aagcacggcc     240
ttcttggtct cctgcactt ccctgttctg ttagagacct ggttatagac aaggcttctc     300
cacagtgttg cagcgtaa                                                    318
```

<210> 151
<211> 323
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(323)
<223> n = A,T,C or G

<400> 151tnacgcngcn acnntgtaga ganggnaagg cnttccccac attnccccttt
catnanagaa   60
```
ttattcnacc aagnntgacc natgccnttt atgacttaca tgcnnactnc ntaatctgtn     120
tcnngcctta aaagcnnntc cactacatgc ntcancactg tntgtgtnac ntcatnaact     180
gtcngnaata ggggcncata actacagaaa tgcanttcat actgcttcca ntgccatcng     240
cgtgtggcct tncctactct tcttntattc caagtagcat ctctggantg cttccccact     300
ctccacattg ttgcagcnat aat                                             323
```

<210> 152
<211> 311
<212> DNA
<213> Homo sapien

<400> 152
```
tcaagattcc ataggctgac cagtccaagg agagttgaaa tcatgaagga gagtctatct      60
ggagagagct gtagttttga gggttgcaaa gacttaggat ggagttggtg ggtgtggtta     120
gtctctaagg ttgattttgt tcataaattt catgccctga atgccttgct tgcctcaccc     180
tggtccaagc cttagtgaac acctaaaagt ctctgtcttc ttgctctcca aacttctcct     240
gaggatttcc tcagattgtc tacattcaga tcgaagccag ttggcaaaca agatgcagtc     300
cagagggtca g                                                          311
```

```
<210> 153
<211> 332
<212> DNA
<213> Homo sapien

<400> 153
caagattcca taggctgacc aggaggctat tcaagatctc tggcagttga ggaagtctct        60
ttaagaaaat agtttaaaca atttgttaaa atttttctgt cttacttcat ttctgtagca       120
gttgatatct ggctgtcctt tttataatgc agagtgggaa ctttccctac catgtttgat       180
aaatgttgtc caggctccat tgccaataat gtgttgtcca aaatgcctgt ttagtttta        240
aagacggaac tccacccttt gcttggtctt aagtatgtat ggaatgttat gataggacat       300
agtagtagcg gtggtcagcc tatggaatct tg                                      332


<210> 154
<211> 345
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(345)
<223> n = A,T,C or G

<400> 154
tcaagattcc ataggctgac ctggacagag atctcctggg tctggcccag gacagcaggc        60
tcaagctcag tggagaaggt ttccatgacc ctcagattcc cccaaacctt ggattgggtg       120
acattgcatc tcctcagaga gggaggagat gtangtctgg gcttccacag ggacctggta       180
ttttaggatc agggtaccgc tggcctgagg cttggatcat tcanagcctg ggggtggaat       240
ggctggcagc ctgtggcccc attgaaatag gctctggggc actccctctg ttcctanttg       300
aacttgggta aggaacagga atgtggtcan cctatggaat cttga                       345


<210> 155
<211> 295
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(295)
<223> n = A,T,C or G

<400> 155
gacgcttggc cacttgacac attaaacagt tttgcataat cactancatg tatttctagt        60
ttgctgtctg ctgtgatgcc ctgccctgat tctctggcgt taatgatggc aagcataatc       120
aaacgctgtt ctgttaattc caagttataa ctggcattga ttaaagcatt atctttcaca       180
actaaactgt tcttcatana acagcccata ttattatcaa attaagagac aatgtattcc       240
aatatccttt anggccaata tatttnatgt cccttaatta agagctactg tccgt            295


<210> 156
<211> 406
<212> DNA
```

<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(406)
<223> n = A,T,C or G

<400> 156
gacgcttggc cacttgacac tgcagtggga aaaccagcat gagccgctgc ccccaaggaa   60
cctcgaagcc caggcagagg accagccatc ccagcctgca ggtaaagtgt gtcacctgtc   120
aggtgggctt ggggtgagtg ggtgggggaa gtgtgtgtgc aaagggggtg tnaatgtnta   180
tgcgtgtgag catgagtgat ggctagtgtg actgcatgtc agggagtgtg aacaagcgtg   240
cgggggtgtg tgtgcaagtg cgtatgcata tgagaatatg tgtctgtgga tgagtgcatt   300
tgaaagtctg tgtgtgtgcg tgtggtcatg anggtaantt antgactgcg caggatgtgt   360
gagtgtgcat ggaacactca ntgtgtgtgt caagtggccn ancgtc   406

<210> 157
<211> 208
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(208)
<223> n = A,T,C or G

<400> 157
tgacgcttgg ccacttgaca cactaaaggg tgttactcat cactttcttc tctcctcggt   60
ggcatgtgag tgcatctatt cacttggcac tcatttgttt ggcagtgact gtaanccana   120
tctgatgcat acaccagctt gtaaattgaa taaatgtctc taatactatg tgctcacaat   180
anggtanggg tgaggagaag gggagaga   208

<210> 158
<211> 547
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(547)
<223> n = A,T,C or G

<400> 158
cttcaacctc cttcaacctc cttcaacctc ctggattcaa acaatcatcc cacctcagac   60
tccttagtag ctgagactac agactcacgc cactacatct ggctaaattt ttgtagagat   120
agggtttcat catgttgccc tggctggtct caaactcctg acctcaagca atgtgcccac   180
ctcagcctcc caaagtgctg ggattacagg cataagccac catgcccagt ccatntttaa   240
tctttcctac cacattctta ccacactttc ttttatgttt agatacataa atgcttacca   300
ttatgataca attgcccaca gtattaagac agtaacatgc tgcacaggtt tgtagcctag   360
gaacagtagg caataccaca tagcttaggt gtgtggtaga ctataccatc taggtttgtg   420
taagttacac tttatgctgt ttacacaatg acaaaaccat ctaatgatgc atttctcaga   480

atgtatcctt gtcagtaagc tatgatgtac agggaacact gcccaaggac acagatattg   540
tacctgt   547

        <210> 159
        <211> 203
        <212> DNA
        <213> Homo sapien

        <400> 159
gctcctcttg ccttaccaac tcacccagta tgtcagcaat tttatcrgct ttacctacga   60
aacagcctgt atccaaacac ttaacacact cacctgaaaa gttcaggcaa caatcgcctt   120
ctcatgggtc tctctgctcc agttctgaac ctttctcttt tcctagaaca tgcatttarg   180
tcgatagaag ttcctctcag tgc   203

        <210> 160
        <211> 402
        <212> DNA
        <213> Homo sapien

        <400> 160
tgtaagtcga gcagtgtgat gggtggaaca gggttgtaag cagtaattgc aaactgtatt   60
taaacaataa taataatatt tagcatttat agagcacttt atatcttcaa agtacttgca   120
aacattayct aattaaatac cctctctgat tataatctgg atacaaatgc acttaaactc   180
aggacagggt catgagaraa gtatgcattt gaaagttggt gctagctatg ctttaaaaac   240
ctatacaatg atgggraagt tagagttcag attctgttgg actgtttttg tgcatttcag   300
ttcagcctga tggcagaatt agatcatatc tgcactcgat gactytgctt gataacttat   360
cactgaaatc tgagtgttga tcatcacact gctcgactta ca   402

        <210> 161
        <211> 193
        <212> DNA
        <213> Homo sapien

        <400> 161
agcatgttga gcccagacac tgaccaggag aaaaaccaac caatagaaac acgcccagac   60
actgaccagg agaaaaacca accaataaaa acaggcccgg acataagaca aataataaaa   120
ttagcggaca aggacatgaa aacagctatt gtaagagcgg atatagtggt gtgtgtctgg   180
gctcaacatg cta   193

        <210> 162
        <211> 147
        <212> DNA
        <213> Homo sapien

        <400> 162
tgttgagccc agacactgac caggagaaaa accaaccaat aaaaacaggc ccggacataa   60
gacaaataat aaaattagcg gacaaggaca tgaaaacagc tattgtaaga gcggatatag   120
tggtgtgtgt ctgggctcaa catgcta   147

        <210> 163
        <211> 294

```
        <212> DNA
        <213> Homo sapien

        <400> 163
tagcatgttg agcccagaca caaatctttc cttaagcaat aaatcatttc tgcatatgtt        60
tttaaaacca cagctaagcc atgattattc aaaaggacta ttgtattggg tattttgatt       120
tgggttctta tctccctcac attatcttca tttctatcat tgacctctta tcccagagac       180
tctcaaactt ttatgttata caaatcacat tctgtctcaa aaaatatctc acccacttct       240
cttctgtttc tgcgtgtgta tgtgtgtgtg tgtgtgtctg ggctcaacat gcta            294

        <210> 164
        <211> 412
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(412)
        <223> n = A,T,C or G

        <400> 164
cgggattggc tttgagctgc agatgctgcc tgtgaccgca cccggcgtgg aacagaaagc        60
cacctggctg caagtgcgcc agagccgccc tgactacgtg ctgctgtggg gctggggcgt       120
gatgaactcc accgccctga aggaagccca ggccaccgga taccccgcg acaagatgta       180
cggcgtgtgg tgggccggtg cggagcccga tgtgcgtgac gtgggcgaag gcgccaaggg       240
ctacaacgcg ctggctctga acggctacgg cacgcagtcc aaggtgatcc angacatcct       300
gaaacacgtg cacgacaagg gccagggcac ggggcccaaa gacgaagtgg gctcggtgct       360
gtacacccgc ggcgtgatca tccagatgct ggacaaggtg tcaatcacta at              412

        <210> 165
        <211> 361
        <212> DNA
        <213> Homo sapien

        <400> 165
ttgacacctt gtccagcatc tgcatctgat gagagcctca gatggctacc actaatggca        60
gaaggcaaag gagaacaggc attgtatggc aagaaaggaa gaaagagaga ggggagaaag       120
gtgctaggtt cttttcaaca accagttctt gatggaactg agagtaagag ctcaaggcca       180
ggtgtggtga ctccaaccag taatcccaac attttaggag gctgaggcag gcagatgtct       240
tgaccccatg agtttgtgac cagcctgaac aacatcatga gactccatct ctacaataat       300
tacaaaaatt aatcaggcat tgtggtatgc cctgtagtcc cagatgctgg acaaggtgtc       360
a                                                                        361

        <210> 166
        <211> 427
        <212> DNA
        <213> Homo sapien

        <400> 166
twgactgact catgtcccct acacccaact atcttctcca ggtggccagg catgatagaa        60
tctgatcctg acttagggga atattttctt tttacttccc atcttgattc cctgccggtg       120
```

```
agtttcctgg ttcagggtaa gaaaggagct caggccaaag taatgaacaa atccatcctc      180
acagacgtac agaataagag aacwtggacw tagccagcag aacmcaaktg aaamcagaac      240
mcttamctag gatracaamc mcrraratar ktgcycmcmc wtataataga aaccaaactt      300
gtatctaatt aaatatttat ccacygtcag ggcattagtg gttttgataa atacgctttg      360
gctaggattc ctgaggttag aatggaaraa caattgcamc gagggtaggg gacatgagtc      420
aktctaa                                                                427
```

```
<210> 167
<211> 500
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(500)
<223> n = A,T,C or G

<400> 167
aacgtcgcat gctcccggcc gccatggccg cgggatagac tgactcatgt cccctaagat       60
agaggagaca cctgctaggt gtaaggagaa gatggttagg tctacggagg ctccagggtg      120
ggagtagttc cctgctaagg gagggtagac tgttcaacct gttcctgctc cggcctccac      180
tatagcagat gcgagcagga gtaggagaga gggaggtaag agtcagaagc ttatgttgtt      240
tatgcgggga aacgccrtat cgggggcagc cragttatta ggggacantr tagwyartcw      300
agntagcatc caaagcgngg gagttntccc atatggttgg acctgcaggc ggccgcatta      360
gtgattagca tgtgagcccc agacacgcat agcaacaagg acctaaactc agatcctgtg      420
ctgattactt aacatgaatt attgtattta tttaacaact ttgagttatg aggcatatta      480
ttaggtccat attacctgga                                                  500
```

```
<210> 168
<211> 358
<212> DNA
<213> Homo sapien

<400> 168
ttcatcgctc ggtgactcaa gcctgtaatc ccagaacttt gggaggccga ggggagcaga       60
tcacctgagg ttgggagttt gagaccagcc tggccaacat ggtgacaacc cgtctctgct      120
aaaaatacaa aaattagcca agcatggtgg catgcacttg taatcccagc tactcgggag      180
gctgaggcag gagaatcact tgaggccagg aggcagaggt tgcagtgagg cagaggttga      240
gatcatgcca ctgcactcca gcctgggcaa cagagtaaga ctccatctca aaaaaaaaaa      300
aaaaaagaa tgatcagagc cacaaataca gaaaaccttg agtcaccgag cgatgaaa         358
```

```
<210> 169
<211> 1265
<212> DNA
<213> Homo sapien

<400> 169
ttctgtccac accaatctta gagctctgaa agaatttgtc tttaaatatc ttttaatagt       60
aacatgtatt ttatggacca aattgacatt ttcgactatt ttttcccaaa aaaagtcagg      120
tgaatttcag cacactgagt tgggaatttc ttatcccaga agwcggcacg agcaatttca      180
tatttatta agattgattc catactccgt tttcaaggag aatccctgca gtctccttaa      240
```

```
aggtagaaca aatactttct atttttttttt caccattgtg ggattggact ttaagaggtg    300
actctaaaaa aacagagaac aaatatgtct cagttgtatt aagcacggac ccatattatc    360
atattcactt aaaaaaatga tttcctgtgc accttttggc aacttctctt ttcaatgtag    420
ggaaaaactt agtcaccctg aaaacccaca aaataaataa aacttgtaga tgtgggcaga    480
argtttgggg gtggacattg tatgtgttta aattaaaccc tgtatcactg agaagctgtt    540
gtatgggtca gagaaaatga atgcttagaa gctgttcaca tcttcaagag cagaagcaaa    600
ccacatgtct cagctatatt attatttatt ttttatgcat aaagtgaatc atttcttctg    660
tattaatttc caaagggttt taccctctat ttaaatgctt tgaaaaacag tgcattgaca    720
atgggttgat attttctttt aaaagaaaaa tataattatg aaagccaaga taatctgaag    780
cctgttttat tttaaaactt tttatgttct gtggttgatg ttgtttgttt gtttgtttct    840
attttgttgg tttttttactt tgttttttgt tttgtttttgt tttggtttdg catactacat    900
gcagtttctt taaccaatgt ctgtttggct aatgtaatta agttgttaa tttatatgag    960
tgcatttcaa ctatgtcaat ggtttcttaa tatttattgt gtagaagtac tggtaatttt   1020
tttatttaca atatgtttaa agagataaca gtttgatatg ttttcatgtg tttatagcag   1080
aagttatttta tttctatggc attccagcgg atattttggt gtttgcgagg catgcagtca   1140
atattttgta cagttagtgg acagtattca gcaacgcctg atagcttctt tggccttatg   1200
ttaaataaaa agacctgttt gggatgtaaa aaaaaaaaa aaaaaaaaa aaaaaaaaa   1260
aaaaa                                                               1265


        <210> 170
        <211> 383
        <212> DNA
        <213> Homo sapien


        <400> 170
tgtaagtcga gcagtgtgat gacgatattc ttcttattaa tgtggtaatt gaacaaatga     60
tctgtgatac tgatcctgag ctaggaggcg ctgttcagtt aatgggactt cttcgtactc    120
taattgatcc agagaacatg ctggctacaa ctaataaaac cgaaaaaagt gaatttctaa    180
attttttcta caaccattgt atgcatgttc tcacagcacc acttttgacc aatacttcag    240
aagacaaatg tgaaaaggat aatatagttg gatcaaacaa aaacaacaca atttgtcccg    300
ataattatca aacagcacag ctacttgcct taattttaga gttactcaca ttttgtgtgg    360
aacatcacac tgctcgactt aca                                            383


        <210> 171
        <211> 383
        <212> DNA
        <213> Homo sapien


        <400> 171
tgggcacctt caatatcgca agttaaaaat aatgttgagt ttattatact tttgacctgt     60
ttagctcaac agggtgaagg catgtaaaga atgtggactt ctgaggaatt ttcttttaaa    120
aagaacataa tgaagtaaca ttttaattac tcaaggacta cttttggttg aagtttataa    180
tctagatacc tctactttt gttttgctg ttcgacagtt cacaaagacc ttcagcaatt    240
tacagggtaa aatcgttgaa gtagtggagg tgaaactgaa atttaaaatt attctgtaaa    300
tactataggg aaagaggctg agcttagaat cttttggttg ttcatgtgtt ctgtgctctt    360
atcatcacac tgctcgactt aca                                            383


        <210> 172
        <211> 699
        <212> DNA
        <213> Homo sapien
```

```
<220>
<221> misc_feature
<222> (1)...(699)
<223> n = A,T,C or G

<400> 172
tcgggtgatg cctcctcagg cttgtcgtta gtgtacacag agctgctcat gaagcgacag      60
cggctgcccc tggcacttca gaacctcttc ctctacactt ttggtgcgct tctgaatcta     120
ggtctgcatg ctggcggcgg ctctggccca ggcctcctgg aaagtttctc aggatgggca     180
gcactcgtgg tgctgagcca ggcactaaat ggactgctca tgtctgctgt catggagcat     240
ggcagcagca tcacacgcct ctttgtggtg tcctgctcgc tggtggtcaa cgccgtgctc     300
tcagcagtcc tgctacggct gcagctcaca gccgccttct tcctggccac attgctcatt     360
ggcctggcca tgcgcctgta ctatggcagc cgctagtccc tgacaacttc caccctgatt     420
ccggaccctg tagattgggc gccaccacca gatccccctc ccaggccttc ctccctctcc     480
catcagcggc cctgtaacaa gtgccttgtg agaaaagctg gagaagtgag ggcagccagg     540
ttattctctg gaggttggtg gatgaagggg tacccctagg agatgtgaag tgtgggtttg     600
gttaaggaaa tgcttaccat cccccacccc caaccaagtt nttccagact aaagaattaa     660
ggtaacatca atacctaggc ctgaggaggc atcacccga                            699


        <210> 173
        <211> 701
        <212> DNA
        <213> Homo sapien


        <400> 173
tcgggtgatg cctcctcagg ccagatcaaa cttggggttg aaaactgtgc aaagaaatca      60
atgtcggaga aagaattttg caaaagaaaa atgcctaatc agtactaatt taataggtca     120
cattagcagt ggaagaagaa atgttgatat tttatgtcag ctattttata atcaccagag     180
tgcttagctt catgtaagcc atctcgtatt cattagaaat aagaacaatt ttattcgtcg     240
gaaagaactt ttcaatttat agcatcttaa ttgctcagga ttttaaattt tgataaagaa     300
agctccactt ttggcaggag tagggggcag ggagagagga ggctccatcc acaaggacag     360
agacaccagg gccagtaggg tagctggtgg ctggatcagt cacaacggac tgacttatgc     420
catgagaaga aacaacctcc aaatctcagt tgcttaatac aacacaagct catttcttgc     480
tcacgttaca tgtcctatgt agatcaacag caggtgactc agggacccag gctccatctc     540
catatgagct tccatagtca ccaggacacg ggctctgaaa gtgtcctcca tgcagggaca     600
catgcctctt cctttcattg ggcagagcaa gtcacttatg ccagaagtc acactgcagg     660
gcagtgccat cctgctgtat gcctgaggag gcatcacccg a                         701


        <210> 174
        <211> 700
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(700)
        <223> n = A,T,C or G


        <400> 174
tcgggtgatg cctcctcang cccctaaatc agagtccagg gtcagagcca caggagacag      60
```

```
ggaaagacat agattttaac cggccccctt caggagattc tgaggctcag ttcactttgt      120
tgcagtttga acagaggcag caaggctagt ggttaggggc acggtctcta aagctgcact      180
gcctggatct gcctcccagc tctgccagga accagctgcg tggccttgag ctgctgacac      240
gcagaaagcc ccctgtggac ccagtctcct cgtctgtaag atgaggacag gactctagga      300
acccttttccc ttggtttggc ctcactttca caggctccca tcttgaactc tatctactct     360
tttcctgaaa ccttgtaaaa gaaaaaagtg ctagcctggg caacatggca aaaccctgtc      420
tctacaaaaa atacaaaaat tagttgggtg tggtggcatg tgcctgtagt cccagccact      480
tgggaggtgc tgaggtggga ggatcacttg agcccgggag gtggaggttg cagtgagcca      540
agatcatgcc actgcactcc agcctgagta atagagtaag actctgtctc aaaaacaaca      600
acaacaacag tgagtgtgcc tctgtttccg ggttggatgg ggcaccacat ttatgcatct      660
ctcagatttg gacgctgcag cctgaggagg catcacccga                            700
```

```
        <210> 175
        <211> 484
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(484)
        <223> n = A,T,C or G


        <400> 175
tatagggcga attgggcccg agttgcatgn tcccggccgc catggccgcg ggattcgggt       60
gatgcctcct caggcttgtc tgccacaagc tacttctctg agctcagaaa gtgccccttg      120
atgagggaaa atgtcctact gcactgcgaa tttctcagtt ccattttacc tcccagtcct      180
ccttctaaac cagttaataa attcattcca caagtattta ctgattacct gcttgtgcca      240
gggactattc tcaggctgaa gaaggtggga ggggagggcg gaacctgagg agccacctga      300
gccagcttta tatttcaacc atggctggcc catctgagag catctcccca ctctcgccaa      360
cctatcgggg catagcccag ggatgccccc aggcggccca ggttagatgc gtccctttgg      420
cttgtcagtg atgacataca ccttagctgc ttagctggtg ctggcctgag gaggcatcac      480
ccga                                                                  484
```

```
        <210> 176
        <211> 432
        <212> DNA
        <213> Homo sapien


        <400> 176
tcgggtgatg cctcctcagg gctcaaggga tgagaagtga cttctttctg gagggaccgt       60
tcatgccacc caggatgaaa atggataggg acccacttgg aggacttgct gatatgtttg      120
gacaaatgcc aggtagcgga attggtactg gtccaggagt tatccaggat agattttcac      180
ccaccatggg acgtcatcgt tcaaatcaac tcttcaatgg ccatggggga cacatcatgc      240
ctcccacaca atcgcagttt ggagagatgg gaggcaagtt tatgaaaagc caggggctaa      300
gccagctcta ccataaccag agtcagggac tcttatccca gctgcaagga cagtcgaagg      360
atatgccacc tcggtttct aagaaaggac agcttaatgc agatgagatt agcctgagga      420
ggcatcaccc ga                                                          432
```

```
        <210> 177
        <211> 788
        <212> DNA
```

<213> Homo sapien

<400> 177

```
tagcatgttg agcccagaca cagtagcatt tgtgccaatt tctggttgga atggtgacaa        60
catgctggag ccaagtgcta acatgccttg gttcaaggga tggaaagtca cccgtaagga       120
tggcaatgcc agtggaacca cgctgcttga ggctctggac tgcatcctac caccaactcg       180
cccaactgac aagcccttgc gcctgcctct ccaggatgtc tacaaaattg gtggtattgg       240
tactgttcct gttggccgag tggagactgg tgttctcaaa cccggtatgg tggtcacctt       300
tgctccagtc aacgttacaa cggaagtaaa atctgtcgaa atgcaccatg aagctttgag       360
tgaagctctt cctggggaca atgtgggctt caatgtcaag aatgtgtctg tcaaggatgt       420
tcgtcgtggc aacgttgctg gtgacagcaa aaatgaccca ccaatggaag cagctggctt       480
cactgctcag gtgattatcc tgaaccatcc aggccaaata agtgccggct atgcccctgt       540
attggattgc cacacggctc acattgcatg caagtttgct gagctgaagg aaaagattga       600
tcgccgttct ggtaaaaagc tggaagatgg ccctaaattc ttgaagtctg gtgatgctgc       660
cattgttgat atggttcctg gcaagcccat gtgtgttgag agcttctcag actatccacc       720
tttgggtcgc tttgctgttc gtgatatgag acagacagtt gcggtgggtg tctgggctca       780
acatgcta                                                                788
```

<210> 178
<211> 786
<212> DNA
<213> Homo sapien

<400> 178

```
tagcatgttg agcccagaca cctgtgtttc tgggagctct ggcagtggcg gattcatagg        60
cacttgggct gcactttgaa tgacacactt ggctttatta gattcactag ttttttaaaaa       120
attgttgttc gtttctttc attaaaggtt taatcagaca gatcagacag cataattttg        180
tatttaatga cagaaacgtt ggtacatttc ttcatgaatg agcttgcatt ctgaagcaag       240
agcctacaaa aggcacttgt tataaatgaa agttctggct ctagaggcca gtactctgga       300
gtttcagagc agccagtgat tgttccagtc agtgatgcct agttatatag aggaggagta       360
cactgtgcac tcttctaggt gtaagggtat gcaactttgg atcttaaaat tctgtacaca       420
tacacacttt atatatatgt atgtatgtat gaaaacatga aattagtttg tcaaatatgt       480
gtgtgtttag tattttagct tagtgcaact atttccacat tatttattaa attgatctaa       540
gacactttct tgttgacacc ttgaatatta atgttcaagg gtgcaatgtg tattcctttta      600
gattgttaaa gcttaattac tatgatttgt agtaaattaa cttttaaaat gtatttgagc       660
ccttctgtag tgtcgtaggg ctcttacagg gtgggaaaga ttttaattttt ccagttgcta      720
attgaacagt atggcctcat tatatatttt gatttatagg agtttgtgtc tgggctcaac       780
atgcta                                                                  786
```

<210> 179
<211> 796
<212> DNA
<213> Homo sapien

<400> 179

```
tagcatgttg agcccagaca ctggttacaa gaccagacct gcttcctcca tatgtaaaca        60
gcttttaaaa agccagtgaa ccttttttaat actttggcaa ccttctttca caggcaaaga      120
acacccccat ccgcccttg tttggagtgc agagtttggc tttggttctt tgccttgcct        180
ggagtatact tctaattcct gttgtcctgc acaagctgaa taccgagcta cccaccgcca       240
cccaggccag gtttccactc atttattact ttatgtttct gttccattgc tggtccacag       300
aaataagttt tcctttggag gaatgtgatt ataccccttt aatttcctcc ttttgctttt       360
```

```
ttttaatatc attggtatgt gtttggccca gaggaaactg aaattcacca tcatcttgac      420
tggcaatccc attaccatgc tttttttaaa aaacgtaatt tttcttgcct tacattggca      480
gagtagccct tcctggctac tggcttaatg tagtcactca gtttctaggt ggcattaggc      540
atgagacctg aagcacagac tgtcttacca caaaaggtga caagatctca aaccttagcc      600
aaagggctat gtcaggtttc aatgctatct gcttctgttc ctgctcactg ttctggattt      660
tgtccttctt catccctagc accagaattt cccagtctcc ctccctacct tcccttgttt      720
taattctaat ctatcagcaa ataacttttt caaatgtttt aaccggtatc tccatgtgtc      780
tgggctcaac atgcta                                                     796
```

```
        <210> 180
        <211> 488
        <212> DNA
        <213> Homo sapien


        <400> 180
ggatgtgctg caaggcgatt aagttgggta acgccagggt tttcccagtc acgacgttgt       60
aaaacgacgg ccagtgaatt gtaatacgac tcactatagg gcgaattggg cccgacgtcg      120
catgctcccg gccgccatgg ccgcgggata gcatgttgag cccagacacc tgcaggtcat      180
ttggagagat ttttcacgtt accagcttga tggtcttttt caggaggaga gacactgagc      240
actcccaagg tgaggttgaa gatttcctct agatagccgg ataagaagac taggagggat      300
gcctagaaaa tgattagcat gcaaatttct acctgccatt tcagaactgt gtgtcagccc      360
acattcagct gcttcttgtg aactgaaaag agagaggtat tgagactttt ctgatggccg      420
ctctaacatt gtaacacagt aatctgtgtg tgtgtgggtg tgtgtgtgtg tctgggctca      480
acatgcta                                                              488
```

```
        <210> 181
        <211> 317
        <212> DNA
        <213> Homo sapien


        <400> 181
tagcatgttg agcccagaca cggcgacggt acctgatgag tggggtgatg gcacctgtga       60
aaaggaggaa cgtcatcccc catgatattg gggacccaga tgatgaacca tggctccgcg      120
tcaatgcata tttaatccat gatactgctg attggaagga cctgaacctg aagtttgtgc      180
tgcaggttta tcgggactat tacctcacgg gtgatcaaaa cttcctgaag gacatgtggc      240
ctgtgtgtct agtaagggat gcacatgcag tggccagtgt gccaggggta tggttggtgt      300
ctgggctcaa catgcta                                                    317
```

```
        <210> 182
        <211> 507
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(507)
        <223> n = A,T,C or G

        <400> 182
tagcatgttg agcccagaca ctggctgtta gccaaatcct ctctcagctg ctccctgtgg       60
tttggtgact caggattaca gaggcatcct gtttcaggga acaaaaagat tttagctgcc      120
```

```
agcagagagc accacataca ttagaatggt aaggactgcc acctccttca agaacaggag      180
tgagggtggt ggtgaatggg aatggaagcc tgcattccct gatgcatttg tgctctctca      240
aatcctgtct tagtcttagg aaaggaagta aagtttcaag gacggttccg aactgctttt      300
tgtgtctggg ctcaacatgc tatcccgcgg ccatggcggc cgggagcatg cgacgtcggg      360
cccaattcgc cctatagtga gtcgtattac aattcactgg ccgtcgtttt acaacgtcgt      420
gactgggaaa accctggcgt tacccaactt aatcgccttg cagcacatcc ccctttccca      480
gctggcgtaa tancgaaaag gcccgca                                         507
```

```
<210> 183
<211> 227
<212> DNA
<213> Homo sapien
```

```
<400> 183
gatttacgct gcaacactgt ggaggtagcc ctggagcaag gcaggcatgg atgcttctgc       60
aatccccaaa tggagcctgg tatttcagcc aggaatctga gcagagcccc ctctaattgt      120
agcaatgata agttattctc tttgttcttc aaccttccaa tagccttgag cttccagggg      180
agtgtcgtta atcattacag cctggtctcc acagtgttgc agcgtaa                    227
```

```
<210> 184
<211> 225
<212> DNA
<213> Homo sapien
```

```
<400> 184
ttacgctgca acactgtgga gcagattaac atcagacttt tctatcaaca tgactggggt       60
tactaaaaag acaacaaatc aatggcttca aaagtctaag gaataatttc gatacttcaa      120
ctttataaaa cctgacaaaa ctatcaatca agcataaaga cagatgaaga acatttccag      180
attttggcca atcagatatt ttacctccac agtgttgcag cgtaa                      225
```

```
<210> 185
<211> 597
<212> DNA
<213> Homo sapien
```

```
<400> 185
ggcccgacgt cgcatgctcc cggccgccat ggccgcggga ttcgttaggg tctctatcca       60
ctgggaccca taggctagtc agagtattta gagttgagtt cctttctgct tcccagaatt      120
tgaaagaaaa ggagtgaggt gatagagctg agagatcaga tttgcctctg aagcctgttc      180
aagatgtatg tgctcagacc ccaccactgg ggcctgtggg tgaggtcctg ggcatctatt      240
tgaatgaatt gctgaagggg agcactatgc caaggaaggg gaacccatcc tggcactggc      300
acaggggtca ccttatccag tgctcagtgc ttctttgctg ctacctggtt ttctctcata      360
tgtgaggggc aggtaagaag aagtgcccrg tgttgtcga gttttagaac atctaccagt      420
aagtgggaa gtttcacaaa gcagcagctt tgtttgtgt attttcacct tcagttagaa      480
gaggaaggct gtgagatgaa tgttagttga gtggaaaaga cgggtaagct tagtggatag      540
agaccctaac gaatcactag tgcggccgcc ttgcaggtcg accatatggg agagctc        597
```

```
<210> 186
<211> 597
<212> DNA
<213> Homo sapien
```

```
        <400> 186
ggcccgaagt tgcatgttcc cggccgccat ggccgcggga ttcgttaggg tctctatcca         60
ctacctaaaa aatcccaaac atataactga actcctcaca cccaattgga ccaatccatc        120
accccagagg cctacagatc ctcctttgat acataagaaa atttccccaa actacctaac        180
tatatcattt tgcaagattt gttttaccaa attttgatgg cctttctgag cttgtcagtg        240
tgaaccacta ttacgaacga tcggatatta actgcccctc accgtccagg tgtagctggc        300
aacatcaagt gcagtaaata ttcattaagt tttcacctac taaggtgctt aaacacccta        360
gggtgccatg tcggtagcag atcttttgat ttgttttat ttcccataag ggtcctgttc        420
aaggtcaatc atacatgtag tgtgagcagc tagtcactat cgcatgactt ggagggtgat        480
aatagaggcc tcctttgctg ttaaagaact cttgtcccag cctgtcaaag tggatagaga        540
ccctaacgaa tcactagtgc ggccgcctgc aggtcgacca tatgggagag ctcccaa          597


        <210> 187
        <211> 324
        <212> DNA
        <213> Homo sapien


        <400> 187
tcgttagggt ctctatccac ttgcaggtaa aatccaatcc tgtgtatatc ttatagtctt         60
ccatatgtag tggttcaaga gactgcagtt ccagaaagac tagccgagcc catccatgtc        120
ttccacttaa ccctgctttg ggttacacat cttaactttt ctgttcaagt ttctctgtgt        180
agtttatagc atgagtattg ggawaatgcc ctgaaacctg acatgagatc tgggaaacac        240
aaacttactc aataagaatt tctcccatat ttttatgatg gaaaaatttc acatgcacag        300
aggagtggat agagaccct acga                                                324


        <210> 188
        <211> 178
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(178)
        <223> n = A,T,C or G


        <400> 188
gcgcggggat tcggggtgat acctcctcat gccaaaatac aacgtntaat ttcacaactt         60
gccttccaat ttacgcattt tcaatttgct ctccccattt gttgagtcac aacaaacacc        120
attgcccaga aacatgtatt acctaacatg cacatactct taaaactact catcccctt         178


        <210> 189
        <211> 367
        <212> DNA
        <213> Homo sapien


        <400> 189
tgacaccttg tccagcatct gacacagtct tggctcttgg aaaatattgg ataaatgaaa         60
atgaatttct ttagcaagtg gtataagctg agaatatacg tatcacatat cctcattcta        120
agacacattc agtgtccctg aaattagaat aggacttaca ataagtgtgt tcactttctc        180
aatagctgtt attcaattga tggtaggcct taaaagtcaa agaaatgaga gggcatgtga        240
```

```
aaaaaagctc aacatcactg atcattagaa aacttccatt caaaccccca atgagatacc       300
atctcatacc agtcagaatg gctattatta aaaagtcaaa aaataacaga tgctggacaa       360
ggtgtca                                                                 367
```

```
        <210> 190
        <211> 369
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(369)
        <223> n = A,T,C or G

        <400> 190
gacaccttgt ccagcatctg acaacgctaa cagcctgagg agatctttat ttatttattt        60
agtttttact ctggctaggc agatggtggc taaaacattc atttacccat ttattcattt       120
aattgttcct gcaaggccta tggatagagt attgtccagc actgctctgg aagctaggag       180
catggggatg aacaagatag gctacatcct gttcccacag aacttccact ttagtctggg       240
aaacagatga tatatacaaa tatataaatg aattcaggta gttttaagta cgaaaagaat       300
aagaaagcag agtcatgatt tanaatgctg gaaacagggg ctattgcttg agatattgaa       360
ggtgcccaa                                                               369
```

```
        <210> 191
        <211> 369
        <212> DNA
        <213> Homo sapien

        <400> 191
tgacaccttg tccagcatct gcacagggaa aagaaactat tatcagagtg aacaggcaac        60
ctacagaatg ggagaaaatt tttgcaatct atccatctga caaagggcta atatccagaa       120
tctacaaaga acttatacaa atttacaaga aacaaacaaa caaacaactc ctcaaaaagt       180
gggtgaagga tgtgaacaga cacttctcaa aagaagacat ttatggggcc aacaaacata       240
tgaaaaaaag ctcatcatca ctggtcacta gataaatgca aatcaaaacc acaatgagat       300
accatctcat tccagttaga atggcaatca ttaaaaagtc aggaaacaac agatgctgga       360
caaggtgtc                                                               369
```

```
        <210> 192
        <211> 449
        <212> DNA
        <213> Homo sapien

        <400> 192
tgacgcttgg ccacttgaca cttcatcttt gcacagaaaa acttctttac agatttaatt        60
caagactggt ctagtgacag tcctccagac attttttcat ttgttccata tacgtggaat       120
tttaaaatca tgtttcatca gtttgaaatg atttgggctg ctaatcaaca caattggatc       180
gactgttcta ctaaacaaca ggaaaatgtg tatctggcag cctgtggaga aacactaaac       240
attgattttt ctttgccttt tacggacttt gttccagcta catgtaatac caagttctct       300
ttaagaggag aagatgttga tcttcatttg tttctaccag actgccaccc tagtaaatat       360
tctttattta tgctggtaaa aaattgccat ccaaataaga tgattcatga tactggtatt       420
cctgctgagt gtcaagtggc caagcgtca                                         449
```

```
<210> 193
<211> 372
<212> DNA
<213> Homo sapien

<400> 193
tgacgcttgg ccacttgaca ccagggatgt akcagttgaa tataatcctg caattgtaca      60
tattggcaat ttcccatcaa acattctaga aagagacaac caggattgct aggccataaa     120
agctgcaata aataactggt aattgcagta atcatttcag gccaattcaa tccagtttgg     180
ctcagaggtg cctttggctg agagaagagg tgagatataa tgtgttttct tgcaacttct     240
tggaagaata actccacaat agtctgagga ctagatacaa acctatttgc cattaaagca     300
ccagagtctg ttaattccag tactgataag tgttggagat tagactccag tgtgtcaagt     360
ggccaagcgt ca                                                        372


<210> 194
<211> 309
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(309)
<223> n = A,T,C or G

<400> 194
tgacgcttgg ccacttgaca cttatgtaga atccatcgtg ggctgatgca agccctttat      60
ttaggcttag tgttgtgggc accttcaata tcacactaga gacaaacgcc acaagatctg     120
cagaaacatt cagttctgan cactcgaatg gcaggataac tttttgtgtt gtaatccttc     180
acatatacaa aaacaaactc tgcantctca cgttacaaaa aaacgtactg ctgtaaaata     240
ttaagaaggg gtaaaggata ccatctataa caaagtaact tacaactagt gtcaagtggc     300
caagcgtca                                                            309


<210> 195
<211> 312
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(312)
<223> n = A,T,C or G

<400> 195
tgacgcttgg ccacttgaca cccaatctcg cacttcatcc tcccagcacc tgatgaagta      60
ggactgcaac tatccccact tcccagatga ggggaccaan gtacacatta ggacccggat     120
gggagcacag atttgtccga tcccagactc caagcactca gcgtcactcc aggacagcgg     180
ctttcagata aggtcacaaa catgaatggc tccgacaacc ggagtcagtc cgtgctgagt     240
taaggcaatg gtgacacgga tgcacgtgtn acctgtaatg gttcatcgta agtgtcaagt     300
ggccaagcgt ca                                                        312
```

```
        <210> 196
        <211> 288
        <212> DNA
        <213> Homo sapien

        <400> 196
tgtatcgacg tagtggtctc ctcagccatg cagaactgtg actcaattaa acctctttcc          60
tttatgaatt acccaatctc gggtagtgtc tttatagtag tgtgagaatg gactaataca         120
agtacatttt acttagtaat aataataaac aaatatatta cattttgtg tatttactac          180
accatatttt ttattgttat tgtagtgtac accttctact tattaaaaga aataggcccg         240
aggcgggcag atcacgaggt caggagatgg agaccactac gtcgatac                      288

        <210> 197
        <211> 289
        <212> DNA
        <213> Homo sapien

        <400> 197
ttgggcacct tcaatatcat gacaggtgat gtgataacca agaaggctac taagtgatta          60
atgggtgggt aatgtataca gagtaggtac actggacaga ggggtaattc atagccaagg         120
caggagaagc agaatggcaa aacatttcat cacactactc aggatagcat gcagtttaaa         180
acctataagt agtttatttt tggaattttc cacttaatat tttcagactg caggtaacta         240
aactgtggaa cacaagaaca tagataaggg gagaccacta cgtcgatac                     289

        <210> 198
        <211> 288
        <212> DNA
        <213> Homo sapien

        <400> 198
gtatcgacgt agtggtctcc caagcagtgg gaagaaaacg tgaaccaatt aaaatgtatc          60
agatacccca aagaaaggcg cttgagtaaa gattccaagt gggtcacaat ctcagatctt         120
aaaattcagg ctgtcaaaga gatttgctat gaggttgctc tcaatgactt caggcacagt         180
cggcaggaga ttgaagccct ggccattgtc aagatgaagg agctttgtgc catgtatggc         240
aagaaagacc ccaatgagcg ggactcctgg agaccactac gtcgatac                      288

        <210> 199
        <211> 1027
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(1027)
        <223> n = A,T,C or G

        <400> 199
gcttttggg aaaaacncaa ntggggaaa gggggnttnn tngcaagggg ataaaggggg           60
aancccaggg tttccccatt cagggaggtg taaaaagncg gccaggggat tgtaanagga        120
ttcaataata ggggggaatgg gcccngaagt tgcaaggttc cngcccgcca tgnccgcggg       180
atttagtgac attacgacgs tggtaataaa gtgggsccaa waaatatttg tgatgtgatt        240
```

```
tttsgaccag tgaacccatt gwacaggacc tcatttccty tgagatgrta gccataatca      300
gataaaagrt tagaagtytt tctgcacgtt aacagcatca ttaaatggag tggcatcacc      360
aatttcaccc tttgttagcc gataccttcc ccttgaaggc attcaattaa gtgaccaatc      420
gtcatacgag aggggatggc atggggattg atgatgatat caggggtgat accttcacag      480
gtgaaaggca tatcctcttg tctatactga ataccacaag taccctttg accatgtcga       540
ctagcaaatt tgtctccaat ctgtgtwatc cctaacagag cgtacccta ttttacaaaa       600
tttatatcct tcctgattga gagttaccat aacctgatcc acaatgcccg tctcgctwgt      660
tctgagaaaa gtgctacagt ctctcttggt atagcgtcta ttggtgctct ccaattcatc      720
ttcattttc aggcaaggtg aactgttttg cctataataa cmtcatctcc tgatacmcga       780
aacccckgga rctatcaaac catcatcatc cagcgttckt watgtymcta aatccctatt      840
gcggccgcct gcaggtcaac atatnggaaa acccccccacc ccttnggagc ntaccttgaa     900
ttttccatat gtcccntaaa ttanctngnc ttancctggc cntaacctnt tccggtttaa      960
attgtttccg cccccnttcc ccnccttnna accggaaacc ttaattttna accngggtt      1020
cctatcc                                                                1027
```

```
        <210> 200
        <211> 207
        <212> DNA
        <213> Homo sapien


        <400> 200
agtgacatta cgacgctggc catcttgaat cctagggcat gaagttgccc caaagttcag       60
cacttggtta agcctgatcc ctctggttta tcacaaagaa taggatggga taaagaaagt      120
ggacacttaa ataagctata aattatatgg tccttgtcta gcaggagaca actgcacagg      180
tatactacca gcgtcgtaat gtcacta                                          207


        <210> 201
        <211> 209
        <212> DNA
        <213> Homo sapien


        <400> 201
tgggcacctt caatatctat taaaagcaca aatactgaag aacacaccaa gactatcaat       60
gaggttacat ctggagtcct cgatatatca ggaaaaaatg aagtgaacat tcacagagtt      120
ttacttcttt gggaactcaa atgctagaaa agaaaagggt gccctctttc tctggcttcc      180
tggtcctatc cagcgtcgta atgtcacta                                        209


        <210> 202
        <211> 349
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(349)
        <223> n = A,T,C or G


        <400> 202
ntacgctgca acactgtgga gccactggtt tttattcccg gcaggttatc cagcaaacag       60
tcactgaaca caccgaagac cgtggtatgg taaccgttca cagtaatcgt tccagtcgtc      120
tgcgggaccc cgacgagcgt cactgggtac agaccagatt cagccggaag agaaagcgcc      180
```

```
gcagggagag actcgaactc cactccgctg gtgagcagcc ccatgttttc aactcgaagt      240
tcaaacggca ttgggttata taccatcagc tgaacttcac acacatctcc ttgaacccac      300
tggaaatcta ttttcttgtt ccgctcttct ccacagtgtt gcagcgtaa                  349
```

```
        <210> 203
        <211> 241
        <212> DNA
        <213> Homo sapien


        <400> 203
tgctcctctt gccttaccaa cccaaagccc actgtgaaat atgaagtgaa tgacaaaatt       60
cagttttcaa cgcaatatag tatagtttat ctgattcttt tgatctccag gacactttaa      120
acaactgcta ccaccaccac caacctaggg atttaggatt ctccacagac cagaaattat      180
ttctcctttg agtttcaggc tcctctggga ctcctgttca tcaatgggtg gtaaatggct      240
a                                                                      241
```

```
        <210> 204
        <211> 248
        <212> DNA
        <213> Homo sapien


        <400> 204
tagccattta ccacccatct gcaaaccswg acmwwcargr cywgwackya ggcgatttga       60
agtactggta atgctctgat catgttagtt acataagtgt ggtcagttta caaaaattca      120
cagaactaaa tactcaatgc tatgtgttca tgtctgtgtt tatgtgtgtg taatgtttca      180
attaagtttt tttaaaaaaa agagatgatt tccaaataag aaagccgtgt tggtaaggca      240
agaggagc                                                               248
```

```
        <210> 205
        <211> 505
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(505)
        <223> n = A,T,C or G


        <400> 205
tacgctgcaa cactgtggag ccattcatac aggtccctaa ttaaggaaca agtgattatg       60
ctacctttgc acggttaggg taccgcggcc gttaaacatg tgtcactggg caggcggtgc      120
ctctaatact ggtgatgcta gaggtgatgt ttttggtaaa caggcggggt aagatttgcc      180
gagttccttt tactttttttt aacctttcct tatgagcatg cctgtgttgg gttgacagtg      240
ggggtaataa tgacttgttg gttgattgta gatattgggc tgttaattgt cagttcagtg      300
ttttaatctg acgcaggctt atgcggagga gaatgttttc atgttactta tactaacatt      360
agttcttcta tagggtgata gattggtcca attgggtgtg aggagttcag ttatatgttt      420
gggatttttt aggtagtggg tgttganctt gaacgctttc ttaattggtg gctgctttta      480
rgcctactat gggtggtaaa tggct                                            505
```

```
        <210> 206
        <211> 179
```

```
        <212> DNA
        <213> Homo sapien

        <400> 206
tagactgact catgtcccct accaaagccc atgtaaggag ctgagttctt aaagactgaa      60
gacagactat tctctggaga aaaataaaat ggaaattgta ctttaaaaaa aaaaaaaatc     120
ggccgggcat ggtagcacac acctgtaatc ccagctacta ggggacatga gtcagtcta      179

        <210> 207
        <211> 176
        <212> DNA
        <213> Homo sapien

        <400> 207
agactgactc atgtcccta ccccaccttc tgctgtgctg ccgtgttcct aacaggtcac       60
agactggtac tggtcagtgg cctgggggtt ggggacctct attatatggg atacaaattt     120
aggagttgga attgacacga tttagtgact gatgggatat gggtggtaaa tggcta         176

        <210> 208
        <211> 196
        <212> DNA
        <213> Homo sapien

        <400> 208
agactgactc atgtcccta tttaacaggg tctctagtgc tgtgaaaaaa aaaaatgctg       60
aacattgcat ataacttata ttgtaagaaa tactgtacaa tgactttatt gcatctgggt     120
agctgtaagg catgaaggat gccaagaagt ttaaggaata tgggtggtaa atggctaggg     180
gacatgagtc agtcta                                                      196

        <210> 209
        <211> 345
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(345)
        <223> n = A,T,C or G

        <400> 209
gacgcttggc cacttgacac ctttttatttt ttaaggattc ttaagtcatt tangtnactt     60
tgtaagtttt tcctgtgccc ccataagaat gatagcttta aaaattatgc tggggtagca     120
aagaagatac ttctagcttt agaatgtgta ggtatagcca ggattcttgt gaggaggggt     180
gatttagagc aaatttctta ttctccttgc ctcatctgta acatggggat aataatagaa     240
ctggcttgac aaggttggaa ttagtattac atggtaaata catgtaaaat gtttagaatg     300
gtgccaagta tctaggaagt acttgggcat gggtggtaaa tggct                     345

        <210> 210
        <211> 178
        <212> DNA
        <213> Homo sapien
```

```
<400> 210
gacgcttggc cacttgacac tagagtaggg tttggccaac tttttctata aaggaccaga      60
gagtaaatat ttcaggcttt gtgggttgtg cagtctctct tgcaactact cagctctgcc     120
attgtagcat agaaatcagc catagacagg acagaaatga atgggtggta aatggcta       178


<210> 211
<211> 454
<212> DNA
<213> Homo sapien


<400> 211
tgggcacctt caatatctat ccagcgcatc taaattcgct ttttcttga ttaaaaattt       60
caccacttgc tgtttttgct catgtatacc aagtagcagt ggtgtgaggc catgcttgtt     120
ttttgattcg atatcagcac cgtataagag cagtgctttg gccattaatt tatcttcatt     180
gtagacagca tagtgtagag tggtatctcc atactcatct ggaatatttg gatcagtgcc     240
atgttccagc aacattaacg cacattcatc ttcctggcat tgtacggcct ttgtcagagc     300
tgtcctcttt ttgttgtcaa ggacattaag ttgacatcgt ctgtccagca cgagttttac     360
tacttctgaa ttcccattgg cagaggccag atgtagagca gtcctctttt gcttgtccct     420
cttgttcaca tcagtgtccc tgagcataac ggaa                                 454


<210> 212
<211> 337
<212> DNA
<213> Homo sapien


<400> 212
tccgttatgc cacccagaaa acctactgga gttacttatt aacatcaagg ctggaaccta      60
tttgcctcag tcctatctga ttcatgagca catggttatt actgatcgca ttgaaaacat     120
tgatcacctg ggtttcttta tttatcgact gtgtcatgac aaggaaactt acaaactgca     180
acgcagagaa actattaaag gtattcagaa acgtgaagcc agcaattgtt tcgcaattcg     240
gcattttgaa aacaaatttg ccgtggaaac tttaatttgt tcttgaacag tcaagaaaaa     300
cattattgag gaaaattaat atcacagcat aacggaa                              337


<210> 213
<211> 715
<212> DNA
<213> Homo sapien


<220>
<221> misc_feature
<222> (1)...(715)
<223> n = A,T,C or G


<400> 213
tcgggtgatg cctcctcagg catcttccat ccatctcttc aagattagct gtcccaaatg      60
tttttccttc tcttctttac tgataaattt ggactccttc ttgacactga tgacagcttt     120
agtatccttc ttgtcacctt gcagacttta aacataaaaa tactcattgg ttttaaaagg     180
aaaaaagtat acattagcac tattaagctt ggccttgaaa cattttctat cttttattaa     240
atgtcggtta gctgaacaga attcatttta caatgcagag tgagaaaaga agggagctat     300
atgcatttga gaatgcaagc attgtcaaat aaacatttta aatgctttct taaagtgagc     360
```

```
acatacagaa atacattaag atattagaaa gtgttttgc ttgtgtacta ctaattaggg      420
aagcaccttg tatagttcct cttctaaaat tgaagtagat tttaaaaacc catgtaattt      480
aattgagctc tcagttcaga tttttaggaga attttaacag ggatttggtt ttgtctaaat     540
tttgtcaatt tntttagtta atctgtataa ttttataaat gtcaaactgt atttagtccg      600
ttttcatgct gctatgaaag aaatacccan gacagggtta tttataaang gaaagangtt      660
aatttgactc ccagttcaca ggcctgagga ngnatcnccc gaaatcctta ttgcg           715
```

```
        <210> 214
        <211> 345
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(345)
        <223> n = A,T,C or G

        <400> 214
ggtaangngc atacntcggt gctccggccg ccggagtcgg gggattcggg tgatgcctcc       60
tcaggcccac ttgggcctgc ttttcccaaa tggcagctcc tctggacatg ccattccttc      120
tcccacctgc ctgattcttc atatgttggg tgtccctgtt tttctggtgc tatttcctga      180
ctgctgttca gctgccactg tcctgcaaag cctgcctttt taaatgcctc accattcctt      240
catttgtttc ttaaatatgg gaagtgaaag tgccacctga ggccgggcac agtggctcac      300
gcctgtaatc ccagcacttt gggagcctga ggaggcatca cccga                     345
```

```
        <210> 215
        <211> 429
        <212> DNA
        <213> Homo sapien

        <400> 215
ggtgatgcct cctcaggcga agctcaggga ggacagaaac ctcccgtgga gcagaagggc       60
aaaagctcgc ttgatcttga ttttcagtac gaatacagac cgtgaaagcg gggcctcacg      120
atccttctga ccttttgggt tttaagcagg aggtgtcaga aaagttacca cagggataac      180
tggcttgtgg cggccaagcg ttcatagcga cgtcgctttt tgatccttcg atgtcggctc      240
ttcctatcat tgtgaagcag aattcaccaa gcgttggatt gttcacccac taatagggaa      300
cgtgagctgg gtttagaccg tcgtgagaca ggttagtttt accctactga tgatgtgtkg      360
ttgccatggt aatcctgctc agtacgagag gaaccgcagg ttcasacatt tggtgtatgt      420
gcttgcctt                                                             429
```

```
        <210> 216
        <211> 593
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(593)
        <223> n = A,T,C or G

        <400> 216
```

```
tgacacctat gtccngcatc tgttcacagt ttccacaaat agccagcctt tggccacctc    60
tctgtcctga ggtatacaag tatatcagga ggtgtatacc ttctcttctc ttccccacca   120
aagagaacat gcaggctctg gaagctgtct taggagcctt tgggctcaga atttcagagt   180
cttgggtacc ttggatgtgg tctggaagga gaaacattgg ctctggataa ggagtacagc   240
cggaggaggg tcacagagcc ctcagctcaa gcccctgtgc cttagtctaa aagcagcttt   300
ggatgaggaa gcaggttaag taacatacgt aagcgtacac aggtagaaag tgctgggagt   360
cagaattgca cagtgtgtag gagtagtacc tcaatcaatg agggcaaatc aactgaaaga   420
agaagaccna ttaatgaatt gcttangggg aaggatcaag gctatcatgg agatctttct   480
aggaagatta ttgtttanaa ttatgaaagg antagggcag ggacagggcc agaagtanaa   540
ganaacattg cctatanccc ttgtcttgca cccagatgct ggacaaggtg tca           593
```

        <210> 217
        <211> 335
        <212> DNA
        <213> Homo sapien

        <400> 217
```
tgacaccttg tccagcatct gacgtgaaga tgagcagctc agaggaggtg tcctggattt    60
cctggttctg tgggctccgt ggcaatgaat tcttctgtga agtggatgaa gactacatcc   120
aggacaaatt taatcttact ggactcaatg agcaggtccc tcactatcga caagctctag   180
acatgatctt ggacctggag cctgatgaag aactggaaga caaccccaac cagagtgacc   240
tgattgagca ggcagccgag atgctttatg gattgatcca cgcccgctac atccttacca   300
accgtggcat cgcccagatg ctggacaagg tgtca                               335
```

        <210> 218
        <211> 248
        <212> DNA
        <213> Homo sapien

        <400> 218
```
tacgtactgg tcttgaaggt cttaggtaga gaaaaaatgt gaatatttaa tcaaagacta    60
tgtatgaaat gggactgtaa gtacagaggg aagggtggcc cttatcgcca gaagttggta   120
gatgcgtccc cgtcatgaaa tgttgtgtca ctgcccgaca tttgccgaat tactgaaatt   180
ccgtagaatt agtgcaaatt ctaacgttgt tcatctaaga ttatggttcc atgtttctag   240
tacttta                                                              248
```

        <210> 219
        <211> 530
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(530)
        <223> n = A,T,C or G

        <400> 219
```
tgacgcttgg ccacttgaca caagtagggg ataaggacaa agacccatna ggtggcctgt    60
cagccttttg ttactgttgc ttccctgtca ccacggcccc ctctgtaggg gtgtgctgtg   120
ctctgtggac attggtgcat tttcacacat accattctct ttctgcttca cagcagtcct   180
gaggcgggag cacacaggac taccttgtca gatgangata atgatgtctg gccaactcac   240
```

```
cccccaacct tctcactagt tatangaaga gccangccta naaccttcta tcctgncccc     300
ttgccctatg acctcatccc tgttccatgc cctattctga tttctggtga actttggagc     360
agcctggttt ntcctcctca ctccagcctc tctccatacc atggtanggg ggtgctgttc     420
cacncaaang gtcaggtgtg tctggggaat cctnananct gccnggagtt tccnangcat     480
tcttaaaaac cttcttgcct aatcanatng tgtccagtgg ccaaccntcn                530
```

```
        <210> 220
        <211> 531
        <212> DNA
        <213> Homo sapien


        <400> 220
tgacgcttgg ccacttgaca ctaaatagca tcttctaaag gcctgattca gagttgtgga      60
aaattctccc agtgtcaggg attgtcagga acagggctgc tcctgtgctc actttacctg     120
ctgtgtttct gctggaaaag gagggaagag gaatggctga tttttaccta atgtctccca     180
gtttttcata ttcttcttgg atcctcttct ctgacaactg ttcccttttg gtcttcttct     240
tcttgctcag agagcaggtc tctttaaaac tgagaaggga gaatgagcaa atgattaaag     300
aaaacacact tctgaggccc agagatcaaa tattaggtaa atactaaacc gcttgcctgc     360
tgtggtcact tttctcctct ttcacatgct ctatccctct atcccccacc tattcatatg     420
gctttatct gccaagttat ccggcctctc atcaaccttc tccctagcc tactggggga       480
tatccatctg ggtctgtctc tggtgtattg gtgtcaagtg gccaagcgtc a              531
```

```
        <210> 221
        <211> 530
        <212> DNA
        <213> Homo sapien


        <400> 221
attgacgctt ggccacttga cacccgcctg cctgcaatac tggggcaagg gccttcactg      60
ctttcctgcc accagctgcc actgcacaca gagatcagaa atgctaccaa ccaagactgt     120
tggtcctcag cctctctgag gagaaagagc agaagcctgg aagtcagaag agaagctaga     180
tcggctacgg ccttggcagc cagcttcccc acctgtggca ataaagtcgt gcatggctta     240
acaatggggg cacctcctga gaaacacatt gttaggcaat tcggcgtgtg ttcatcagag     300
catatttaca caaacctcga tagtgcagcc tactatccac tattgctcct acgctgcaaa     360
cctgaacagc atgggactgt actgaatact ggaagcagct ggtgatggta cttatttgtg     420
tatctaaaca cagagaaggt acagtaagaa tatggtatca taaacttaca gggaccgcca     480
tcctatatgc agtctgttgt gaccaaaatg tgtcaagtgg ccaagcgtca                530
```

```
        <210> 222
        <211> 578
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(578)
        <223> n = A,T,C or G


        <400> 222
tgtatcgacg tagtggtctc cgggctacta ggccgttgtg tgctggtagt acctggttca      60
ctgaaaggcg catctccctc cccgcgtcgc cctgaagcag ggggaggact tcgcccagcc     120
```

```
aaggcagttg tatgagtttt agctgcggca cttcgagacc tctgagccca cctccttcag      180
gagccttccc cgattaagga agccagggta aggattcctt cctcccccag acaccacgaa      240
caaaccacca cccccccctat tctggcagcc catatacatc agaacgaaac aaaaataaca     300
aataaacnaa aaccaaaaaa aaaagagaag gggaaatgta tatgtctgtc catcctgttg      360
ctttagcctg tcagctccta nagggcaggg accgtgtctt ccgaatggtc tgtgcagcgc      420
cgactgcggg aagtatcgga ggaggaagca gagtcagcag aagttgaacg gtgggcccgg      480
cggctcttgg gggctggtgt tgtacttcga daccgctttc gcttttgtc ttagatttac       540
gtttgctctt tggagtggga naccactacn tcnataca                             578
```

```
        <210> 223
        <211> 578
        <212> DNA
        <213> Homo sapien

        <400> 223
tgtatcgacg tagtggtctc ctcttgcaaa ggactggctg gtgaatggtt tccctgaatt       60
atggacttac cctaaacata tcttatcatc attaccagtt gcaaaatatt agaatgtgtt      120
gtcactgttt catttgattc ctagaaggtt agtcttagat atgttacttt aacctgtatg      180
ctgtagtgct ttgaatgcat tttttgtttg cattttttgtt tgcccaacct gtcaattata    240
gctgcttagg tctggactgt cctggataaa gctgttaaaa tattcaccag tccagccatc     300
ttacaagcta attaagtcaa ctaaatgctt ccttgttttg ccagacttgt tatgtcaatc     360
ctcaatttct gggttcattt tgggtgccct aaatcttagg gtgtgacttt cttagcatcc     420
tgtaacatcc attcccaagc aagcacaact tcacataata ctttccagaa gttcattgct     480
gaagcctttc cttcacccag cggagcaact tgattttcta caacttccct catcagagcc     540
acaagagtat gggatatgga gaccactacg tcgataca                            578
```

```
        <210> 224
        <211> 345
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(345)
        <223> n = A,T,C or G

        <400> 224
tgtatcgacg tantggtctc ccaaggtgct gggattgcag gcatgagcca ccactcccag       60
gtggatcttt ttctttatac ttacttcatt aggtttctgt tattcaagaa gtgtagtggt      120
aaaagtcttt tcaatctaca tggttaaata atgatagcct gggaaataaa tagaaatttt      180
ttctttcatc tttaggttga ataaagaaac agaaaaaata gaacatactg aaaataatct     240
aagttccaac catagaagaa ctgcagaaga aatgaagaaa gtgatgatga tttagatttt     300
gatattgatt tagaagacac aggaggagac cactacgtcg ataca                   345
```

```
        <210> 225
        <211> 347
        <212> DNA
        <213> Homo sapien

        <400> 225
tgtatcgacg tagtggtctc caaactgagg tatgtgtgcc actagcacac aaagccttcc       60
```

```
aacagggacg caggcacagg cagtttaaag ggaatctgtt tctaaattaa tttccacctt      120
ctctaagtat tctttcctaa aactgatcaa ggtgtgaagc ctgtgctctt tcccaactcc      180
cctttgacaa cagccttcaa ctaacacaag aaaaggcatg tctgacactc ttcctgagtc      240
tgactctgat acgttgttct gatgtctaaa gagctccaga acaccaaagg gacaattcag      300
aatgctggtg tataacagac tccaatggag accactacgt cgataca                    347
```

```
        <210> 226
        <211> 281
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(281)
        <223> n = A,T,C or G

        <400> 226
aggngngggga ntgtatcgac gtagtggtct cccaacagtc tgtcattcag tctgcaggtg       60
tcagtgtttt ggacaatgag gcaccattgt cacttattga ctcctcagct ctaaatgctg      120
aaattaaatc ttgtcatgac aagtctggaa ttcctgatga ggtttacaa agtattttgg       180
atcaatactc caacaaatca gaaagccaga aagaggatcc tttcaatatt gcagaaccac      240
gagtggattt acacacctca ggagaccact acgtcgatac a                          281
```

```
        <210> 227
        <211> 3646
        <212> DNA
        <213> Homo sapien

        <400> 227
gggaaacact tcctcccagc cttgtaaggg ttggagccct ctccagtata tgctgcagaa       60
tttttctctc ggtttctcag aggattatgg agtccgcctt aaaaaaggca agctctggac      120
actctgcaaa gtagaatggc caaagtttgg agttgagtgg ccccttgaag ggtcactgaa      180
cctcacaatt gttcaagctg tgtggcgggt tgttactgaa actcccggcc tccctgatca      240
gtttccctac attgatcaat ggctgagttt ggtcaggagc acccccttccg tggctccact      300
catgcaccat tcataatttt acctccaagg tcctcctgag ccagaccgtg ttttcgcctc      360
gaccctcagc cggttcggct cgccctgtac tgcctctctc tgaagaagag gagagtctcc      420
ctcacccagt cccaccgcct taaaaccagc ctactccctt agggtcatcc catgtctcct      480
cggctatgtc ccctgtaggc tcatcaccca ttgcctcttg gttgcaaccg tggtgggagg      540
aagtagcccc tctactacca ctgagagagg cacaagtccc tctgggtgat gagtgctcca      600
ccccccttcct ggtttatgtc ccttctttct acttctgact tgtataattg gaaaacccat      660
aatcctccct tctctgaaaa gccccaggct ttgacctcac tgatggagtc tgtactctgg      720
acacattggc ccacctggga tgactgtcaa cagctccttt tgaccctttt cacctctgaa      780
gagagggaaa gtatccaaag agaggccaaa aagtacaacc tcacatcaac caataggccg      840
gaggaggaag ctagaggaat agtgattaga gacccaattg ggacctaatt gggacccaaa      900
tttctcaagt ggagggagaa cttttgacga tttccaccgg tatctcctcg tgggtattca      960
gggagctgct cagaaaccta taaacttgtc taaggcgact gaagtcgtcc aggggcatga     1020
tgagtcacca ggagtgtttt tagagcacct ccaggaggct tatcagattt acaccccttt     1080
tgacctggca gcccccgaaa atagccatgc tcttaatttg gcatttgtgg ctcaggcagc     1140
cccagatagt aaaaggaaac tccaaaaact agagggattt tgctggaatg aataccagtc     1200
agctttttaga gatagcctaa aaggtttttg acagtcaaga ggttgaaaaa caaaaacaag     1260
cagctcaggc agctgaaaaa agccactgat aaagcatcct ggagtatcag agtttactgt     1320
```

```
tagatcagcc tcatttgact tcccctccca catggtgttt aaatccagct acactacttc    1380
ctgactcaaa ctccactatt cctgttcatg actgtcagga actgttggaa actactgaaa    1440
ctggccgacc tgatcttcaa aatgtgcccc taggaaaggt ggatgccacc atgttcacag    1500
acagtagcag cttcctcgag aagggactac gaaaggccgg tgcagctgtt accatggaga    1560
cagatgtgtt gtgggctcag gctttaccag caaacacctc agcacaaaag gctgaattga    1620
tcgccctcac tcaggctctc cgatggggta aggatattaa cgttaacact gacagcaggt    1680
acgcctttgc tactgtgcat gtacgtggag ccatctacca ggagcgtggg ctactcacct    1740
cagcaggtgg ctgtaatcca ctgtaaagga catcaaaagg aaaacacggc tgttgcccgt    1800
ggtaaccaga aagctgattc agcagctcaa gatgcagtgt gactttcagt cacgcctcta    1860
aacttgctgc ccacagtctc ctttccacag ccagatctgc ctgacaatcc cgcatactca    1920
acagaagaag aaaactggcc tcagaactca gagccaataa aaatcaggaa ggttggtgga    1980
ttcttcctga ctctagaatc ttcataccccc gaactcttgg gaaaacttta atcagtcacc    2040
tacagtctac cacccattta ggaggagcaa agctacctca gctcctccgg agccgtttta    2100
agatccccca tcttcaaagc ctaacagatc aagcagctct ccggtgcaca acctgcgccc    2160
aggtaaatgc caaaaaaggt cctaaaccca gcccaggcca ccgtctccaa gaaaactcac    2220
caggagaaaa gtgggaaatt gactttacag aagtaaaacc acaccgggct gggtacaaat    2280
accttctagt actggtagac accttctctg gatggactga agcatttgct accaaaaacg    2340
aaactgtcaa tatggtagtt aagttttac tcaatgaaat catccctcga catgggctgc    2400
ctgtttgcca tagggtctga taatggaccg gccttcgcct tgtctatagt ttagtcagtc    2460
agtaaggcgt taaacattca atggaagctc cattgtgcct atcgacccca gagctctggg    2520
caagtagaac gcatgaactg caccctaaaa aacactctta caaaattaat cttagaaacc    2580
ggtgtaaatt gtgtaagtct ccttcctta gccctactta gagtaaggtg caccccttac    2640
tgggctgggt tcttaccttt tgaaatcatg tatgggaggg tgctgcctat cttgcctaag    2700
ctaagagatg cccaattggc aaaaatatca caaactaatt tattacagta cctacagtct    2760
ccccaacagg tacaagatat catcctgcca cttgttcgag gaacccatcc caatccaatt    2820
cctgaacaga cagggccctg ccattcattc ccgccaggtg acctgttgtt tgttaaaaag    2880
ttccagagag aaggactccc tcctgcttgg aagagacctc acaccgtcat cacgatgcca    2940
acggctctga aggtggatgg cattcctgcg tggattcatc actcccgcat caaaaaggcc    3000
aacagagccc aactagaaac atgggtcccc agggctgggt caggcccctt aaaactgcac    3060
ctaagttggg tgaagccatt agattaattc ttttcttaa ttttgtaaaa caatgcatag    3120
cttctgtcaa acttatgtat cttaagactc aatataaccc ccttgttata actgaggaat    3180
caatgatttg attcccccaa aaacacaagt ggggaatgta gtgtccaacc tggttttac    3240
taaccctgtt tttagactct cccttcctt taatcactca gcttgtttcc acctgaattg    3300
actctcctt agctaagagc gccagatgga ctccatcttg gctctttcac tggcagccgc    3360
ttcctcaagg acttaacttg tgcaagctga ctcccagcac atccaagaat gcaattaact    3420
gataagatac tgtggcaagc tatatccgca gttcccagga attcgtccaa ttgatcacag    3480
cccctctacc cttcagcaac caccaccctg atcagtcagc agccatcagc accgaggcaa    3540
ggccctccac cagcaaaaag attctgactc actgaagact tggatgatca ttagtatttt    3600
tagcagtaaa gttttttttt ctttttcttt ctttttttct cgtgcc                  3646
```

```
<210> 228
<211> 419
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(419)
<223> n = A,T,C or G

<400> 228
```

```
taagagggta caagatctaa gcacagccgt caatgcagaa cacagaacgt agcctggtaa        60
gtgtgttaag agtgggaatt tttggagtac agagtaaggc acctaacct agctggggtt        120
tggtgacggt cccagatggc ttacagaaga aagtgtcctg agatgagttt ttaagaatga        180
ataaggatag acacaagtga ggactgactt ggcagtggtg aatggtgggt ggcaaaaaac        240
ttcgcatgta tggaaactgc acgtacagga atgaagaatg agactgtgtg gtgtttaatg        300
agctgcaaat actaatttta tcctgaaagt tttgaagagt taactaaaaa gtattttta         360
gtaaggaaat aaccctacat ttcagggtta ttgtttgttt anatattgaa ggtgcccaa        419
```

```
        <210> 229
        <211> 148
        <212> DNA
        <213> Homo sapien
```

```
        <400> 229
aagagggtac ctgtatgtag ccatggtggc aatgagagac tgattactac ctgctggaga        60
ttgtttaagt gagttaatat attaaggata aagggagcca ggttttttga ctgttggaga        120
aggaaattac agatattgaa ggtcccaa                                           148
```

```
        <210> 230
        <211> 257
        <212> DNA
        <213> Homo sapien
```

```
        <400> 230
taagagggta cmaaaaaaaa aaaatagaac gaatgagtaa gacctactat ttgatagtac        60
aacagggtga ctatagtcaa tgataactta attatacatt taacatagag tgtaattgga        120
ttgtttgtaa ctcgaaggat aaatgcttga gaggatggat accccattct ccatgatgta        180
cttatttcac attacatgcc tgtatcaaag catctcatat accctataaa tatgtacacc        240
tactatgtac cctctta                                                       257
```

```
        <210> 231
        <211> 260
        <212> DNA
        <213> Homo sapien
```

```
        <400> 231
taagagggta cgggtatttg ctgatgggat tttttttct ttcttttct ttggaaaaca         60
aaatgaaagc cagaacaaaa ttattgaaca aaagacaggg actaaatctg gagaaatgaa        120
gtcccctcac ctgactgcca tttcattcta tctgaccttc cagtctaggt taggagaata        180
gggggtggag gggattaatc tgatacaggt atatttaaag caactctgca tgtgtgccag        240
aagtccatgg taccctctta                                                    260
```

```
        <210> 232
        <211> 596
        <212> DNA
        <213> Homo sapien
```

```
        <220>
        <221> misc_feature
        <222> (1)...(596)
        <223> n = A,T,C or G
```

```
      <400> 232
tgctcctctt gccttaccaa ccacaaatta gaaccataat gagatgtcac ctcatacctg        60
gtgggattaa cattatttaa aaaatcagaa gtattgacaa ggatgtgaag aaattagaac       120
atctgtgcac tgttggtggg aatgtaaaaa aggtgtggcc actatgggta acagcatgaa       180
ggttcctcaa aaaaaatttt ttttaatcta ctctatgatc gatcttgagg ttgtttatgc       240
aaaagaactg aaatcaggat tttgaggaaa tattcacatt cccacatcca tttctgcttt       300
attcataata ctcaagagat ggaaacaacc taaatgtcca tcccgggatg aatggataaa       360
cacagtgtgg tatatgcata caatggaata ttatttagtc tttaaaaaga aaaattctat       420
catatactac aacttanatn aaccttgagg acacaatgct nagtgaaata agccacggaa       480
ggacgaatac tgcattattc ccttatatga agtatctaaa gtggtcaaac tcttanagca       540
naaagtaaaa atgggtggtt gccanacagt tggttaggcn agaaganaan cctant         596


      <210> 233
      <211> 96
      <212> DNA
      <213> Homo sapien


      <400> 233
tcttctgaag acctttcgcg actcttaagc tcgtggttgg taaggcaaga ggagcgttgg        60
taaggcaaga ggagcgttgg taaggcaaga ggagca                                  96


      <210> 234
      <211> 313
      <212> DNA
      <213> Homo sapien


      <400> 234
tgtaagtcga gcagtgtgat gataaaactt gaatggatca atagttgctt cttatggatg        60
agcaaagaaa gtagtttctt gtgatggaat ctgctcctgg caaaaatgct gtgaacgttg       120
ttgaaaagac aacaaagagt ttagagtagt acataaattt agaatagtac ataaacttag       180
aatagtacat aaacttagta cataaataat gcacgaagca ggggcagggc ttgagagaat       240
tgacttcaat ttggaaagag tatctactgt aggttagatg ctctcaaaca gcatcacact       300
gctcgactta caa                                                          313


      <210> 235
      <211> 550
      <212> DNA
      <213> Homo sapien


      <400> 235
aacgaggaca gatccttaaa aagaatgttg agtgaaaaaa gtagaaaata agataatctc        60
caaagtccag tagcattatt taaacatttt taaaaaatac actgataaaa attttgtaca       120
tttcccaaaa atacatatgg aagcacagca gcatgaatgc ctatgggrtt gaggataggg       180
gttgggagta gggatgggga taaaggggga aaataaaacc agagaggagt cttacacatt       240
tcatgaacca aggagtataa ttatttcaac tatttgtacc wgaagtccag aaagagtgga       300
ggcagaaggg ggagaagagg gcgaagaaac gtttttggga gaggggtccc asaagagaga       360
ttttcgcgat gtggcgctac atacgttttt ccaggatgcc ttaagctctg caccctattt       420
ttctcatcac taatattaga ttaaaccctt tgaagacagc gtctgtggtt tctctacttc       480
agctttccct ccgtgtcttg cacacagtag ctgttttaca agggttgaac tgactgaagt       540
gagattattc                                                             550
```

```
        <210> 236
        <211> 325
        <212> DNA
        <213> Homo sapien

        <400> 236
tagactgact catgtccccct accagagtag ctagaattaa tagcacaagc ctctacaccc     60
aggaactcac tattgaatac ataaatggaa tttattcagc cttaaaaagt ttggaaggaa    120
attctgacat atgctaaaac atggatgaac cttgaagact ttatgataag taaaagaagc    180
cagtcataaa aggaaaaata ttgcatgatt ccacttatat gaggtaccta gagtagtcaa    240
tttcatagaa acacaaaata gaatggtgtt tgccagggct tttgaggaaa agggaatgac    300
aagttagggg acatgagtca gtcta                                          325


        <210> 237
        <211> 373
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(373)
        <223> n = A,T,C or G


        <400> 237
tagactgact catgtccccct atctactcaa catttccact tgaagtctga taggcatctc     60
agacttatct tgtcccaaag caaactcttt atttcttttc atcctagtct ttatttcttg    120
tgctgtctta cccatctcaa aagagtgcca aaatccacca agttgctgaa acagaaatct    180
aagaaatatc cttgattctt ctttttccca tctacttcac ttctaattca ttagtaaata    240
atctgtttca gaaaaccaaa cacctcatgt tctcactcat aagggggagt tgaacaatga    300
gaacacacag acacagggag gggaacatca cacaccacgg cccgtcaggg agtangggac    360
atgagtcagt cta                                                       373


        <210> 238
        <211> 492
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(492)
        <223> n = A,T,C or G


        <400> 238
tagactgact catgtccccct ataatgctcc caggcatcag aaagcatctc aaactggagc     60
tgacaccatg gcagaggttt caggtaagtc acaaaagggg tcctaaagaa tttgccctca    120
atatcagagt gattagaaga agtggacaga gctacccaag ttaaacatat gcgagataaa    180
aaaaatatgg cacttgtgaa cacacactac aggaggaaaa taaggaacat aatagcatat    240
tgtgctatta tgatgatgaa gaacctctct anaagaaaac ataaccaaag aaacaaagaa    300
aattcctgcn aatgtttaat gctatagaag aaattaacaa aaacatatat tcaatgaatt    360
cagaaaagtt agcaggtcan aagaaaacaa atcaaagacc agaataatcc catttttagat    420
```

```
tgtcgagtaa actanaacag aaagaatacc actggaaatt gaattcctac gtangggaca      480
tgantcantc ta                                                           492
```

```
        <210> 239
        <211> 482
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(482)
        <223> n = A,T,C or G

        <400> 239
tggaaagtat ttaatgatgg gcaacttgct gtttacttcc tacatatccc atcatcttct       60
gtattttttt aaataacttt tttttggatt tttaaagtaa ccttattctg agaggtaaca      120
tggattacat acttctaagc cattaggaga ctctatgtta aaccaaaagg aaatgttact      180
agatcttcat ttgatcaata ggatgtgata atcatcatct ttctgctcta atggaaaagt      240
actanaaaca tggaaccata atcttagatg aacaacgtta gaatttgcac taattctacg      300
gaatttcagt aattcggcaa atgtcgggca gtgacacaac atttcatgac ggggacgcat      360
ctaccaactt ctggcgataa gggccaccct tccctctgta cttacagtcc catttcatac      420
acagtctttg attaaatatt cacatttttt ctctacctaa agaccttcaa gaccagtacg      480
ta                                                                      482
```

```
        <210> 240
        <211> 519
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(519)
        <223> n = A,T,C or G

        <400> 240
tgtatcgacg tagtggtctc cccatgtgat agtctgaaat atagcctcat gggatgagag       60
gctgtgcccc agcccgacac ccgtaaaggg tctgtgctga ggtggattag taaaagagga      120
aagccttgca gttgagatag aggaagggca ctgtctcctg cctgcccctg ggaactgaat      180
gtctcggtat aaaacccgat tgtacatttg ttcaattctg agataggaga aaaaccaccc      240
tatggcggga ggcgagacat gttggcagca atgctgcctt gttatgcttt actccacaga      300
tgtttgggcg gagggaaaca taaatctggc ctacgtgcac atccaggcat agtacctccc      360
tttgaactta attatgacac agattccttt gctcacatgt ttttttgctg accttctcct      420
tattatcacc ctgctctcct accgcattcc ttgtgctgag ataatgaaaa taatatcaat      480
aaaaacttga nggaactcgg agaccactac gtcgataca                             519
```

```
        <210> 241
        <211> 771
        <212> DNA
        <213> Homo sapien

        <220>
```

```
<221> misc_feature
<222> (1)...(771)
<223> n = A,T,C or G

<400> 241
tgtatcgacg tagtggtctc cactcccgcc ttgacggggc tgctatctgc cttccaggcc      60
actgtcacgg ctcccgggta gaagtcactt atgagacaca ccagtgtggc cttgttggct     120
tgaagctcct cagaggaggg tgggaacaga gtgaccgagg gggcagcctt gggctgacct     180
aggacggtca gcttggtccc tccgccaaac acgagagtgc tgctgcttgt atatgagctg     240
cagtaataat cagcctcgtc ctcagcctgg agcccagaga tggtcaggga ggccgtgttg     300
ccanacttgg agccagagaa gcgattagaa acccctgagg ccgattacc gacctcataa      360
atcatgaatt tgggggcttt gcctgggtgc tgttggtacc angagacatt attataacca     420
ccaacgtcac tgctggttcc antgcaggga aaatggttga tcnaactgtc caagaaaacc     480
actacgtcca taccaatcca ctaattgccn gccgcctgca ggttcaacca tattggggaa     540
naactccccn ccgccgtttg ggattgncat naacctttga aattttttcc tattanttgt     600
cccctaaaa taaaccnttg ggcnttaatc cattgggtcc atancttntt tncccggttt      660
ttaaaanttg tttatcccgc cnccnnattt ccccccaac tttccaaaac ccgaaaccnt       720
tnaaatttnt tnaaccctg gggggttccc nnaattnnan ttnaanctnc c               771


<210> 242
<211> 167
<212> DNA
<213> Homo sapien

<400> 242
tgggcacctt caatatcggg ctcatcgata acatcacgct gctgatgctg ctgttgctgg      60
tcctctctag gaacctctgg attttcaaat tctttgagga attcatccaa attatctgcc     120
tctcctcctt tcctcctttt tctaaggtct ctggtacaa gcggtca                     167


<210> 243
<211> 338
<212> DNA
<213> Homo sapien

<400> 243
ttgggcacct tcaatatcta ctgatctaaa tagtgtggtt tgaggcctct tgttcctggc      60
taaaaatcct tggcaagagt caatctccac tttacaatag aggtaaaaat cttacaatgg     120
atattcttga caaagctagc atagagacag caattttaca caaggtattt ttcacctgtt     180
taataacagt ggttttccta cacccatagg gtgccaccaa gggaggagtg cacagttgca     240
gaaacaaatt aagatactga agacaacact acttaccatt tcccgtatag ctaaccacca     300
gttcaactgt acatgtatgt tcttatgggc aatcaaga                             338


<210> 244
<211> 346
<212> DNA
<213> Homo sapien

<400> 244
tttttggctc ccatacagca cactctcatg ggaaatgtct gttctaaggt caacccataa      60
tgcaaaaatc atcaatatac ttgaagatcc ccgtgtaagg tacaatgtat ttaatatttat    120
cactgataca attgatccaa taccagtttt agtctggcat tgaatcaaat cactgttttt     180
```

```
gttgtataaa aagagaaata tttagcttat atttaagtac catattgtaa gaaaaaagat    240
gcttatcttt acatgctaaa atcatgatct gtacattggt gcagtgaata ttactgtaaa    300
agggaagaag gaatgaagac gagctaagga tattgaaggt gcccaa                   346
```

```
        <210> 245
        <211> 521
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(521)
        <223> n = A,T,C or G

        <400> 245
accaatccca cacggatact gagggacaag tatatcatcc catttcatcc ctacagcagc     60
aacttcatga ggcaggagtt attagtccca ttttacagaa gaggaaactg agacttaggg    120
agatcaagta atttgcccag gtcgcacaat tagtgataga gccagggctt gaagcgacgt    180
ctgtcttaag ccaatgaccc ctgcagatta ttagagcaac tgttctccac aacagtgtaa    240
gcctcttgct anaagctcag gtccacaagg gcagagattt ttgtctgttt tgctcattgc    300
tccttcccca ttgcttagag cagggtctgc cacgaancag gttctcaatg catagttatt    360
aaatgtatat aagagcaaac atatgttaca gagaactttc tgtatgcttg tcacttacat    420
gaatcacctg tganatgggt atgcttgttc cccantgttc cagatnaaga tattgaangt    480
gcccaaatca ctanttgcgg gcgcctgcan gtccancata t                       521
```

```
        <210> 246
        <211> 482
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(482)
        <223> n = A,T,C or G

        <400> 246
tggaaccaat ccaaataccc atcaatgata gactggataa agaaaatttg gcacatgttc     60
accatgaaat actatgcagc cataaaaaag gatgagttca tatcctttgc agggacatgg    120
atgaagctgg agaccatcat tctcagcaaa ctaacaaggg aacagaaaac caaacactgc    180
atgttctcac tcttaagtgg gagctgaaca atgagaacac atggacacag ggaggggaac    240
atcacacagt ggggcctgct ggtgggtagg ggtctagggg agggatagca ttaggagaaa    300
tacctaatgt agatgacggg ttgatgggtg cagcaaacca ccatgacacg tgtataccta    360
tgtaacaaac ctgcatgttc tgcacatgta ccccagaact taaagtgtta ataaaaaaat    420
taagaaaaaa gttaagtatg tcatagatac ataaaatatt gtanatattg aaggtgccca    480
aa                                                                   482
```

```
        <210> 247
        <211> 474
        <212> DNA
        <213> Homo sapien
```

```
<220>
<221> misc_feature
<222> (1)...(474)
<223> n = A,T,C or G

<400> 247
ttcgatacag gcacagagta agcagaaaaa tggctgtggt ttaaccaagt gagtacagtt      60
aagtgagaga ggggcagaga agacaagggc atatgcaggg ggtgattata acaggtggtt     120
gtgctgggaa gtgagggtac tcggggatga ggaacagtga aaaagtggca aaaagtggta     180
agatcagtga attgtacttc tccagaattt gatttctggn ggagtcaaat aactatccag     240
tttggggtat catanggcaa cagttgaggt ataggaggta gaagtcncag tgggataatt     300
gaggttatga anggtttggt actgactggt actgacaang tctgggttat gaccatggga     360
atgaatgact gtanaagcgt anaggatgaa actattccac ganaaagggg tccnaaaact     420
aaaaannnaa gnnnnngggg aatattattt atgtggatat tgaangtgcc caaa           474


<210> 248
<211> 355
<212> DNA
<213> Homo sapien


<220>
<221> misc_feature
<222> (1)...(355)
<223> n = A,T,C or G

<400> 248
ttcgatacag gcaaacatga actgcaggag ggtggtgacg atcatgatgt tgccgatggt      60
ccggatggnc acgaagacgc actggancac gtgcttacgt ccttttgctc tgttgatggc     120
cctgagggga cgcaggaccc ttatgaccct cagaatcttc acaacgggag atggcactgg     180
attgantccc antgacacca gagacacccc aaccaccagn atatcantat attgatgtag     240
ttcctgtaga nggccccctt gtggaggaaa gctccatnag ttggtcatct tcaacaggat     300
ctcaacagtt tccgatggct gtgatgggca tagtcatant taaccntgtn tcgaa          355


<210> 249
<211> 434
<212> DNA
<213> Homo sapien


<400> 249
ttggattggt cctccaggag aacaagggga aaaaggtgac cgagggctcc ctggaactca      60
aggatctcca ggagcaaaag gggatggggg aattcctggt cctgctggtc ccttaggtcc     120
acctggtcct ccaggcttac caggtcctca aggcccaaag ggtaacaaag gctctactgg     180
acccgctggc cagaaaggtg acagtggtct tccagggcct cctgggcctc caggtccacc     240
tggtgaagtc attcagcctt accaatctt gtcctccaaa aaaacgagaa gacatactga     300
aggcatgcaa gcagatgcag atgataatat tcttgattac tcggatggaa tggaagaaat     360
atttggttcc ctcaattccc tgaaacaaga catcgagcat atgaaatttc caatgggtac     420
tcagaccaat ccaa                                                       434


<210> 250
<211> 430
<212> DNA
```

<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(430)
<223> n = A,T,C or G

<400> 250
```
tggattggtc acatggcaga gacaggattc caaggcagtg agaggaggat acaatgcttc      60
tcactagtta ttattattta ttttattttt gagatgaagt ctcgctttgt ctcccaggct     120
ggagagcggt ggtgcgatct tggctctctg caacccccgc ctcaagcaat tctcctgtct     180
tagcctcgcg ggtagatgga attacaggcg cccaccgcca tgcccaacta attttttttgt    240
gtcttcagta gagacagggt ttcgccatgt tgggcaggct ggtcttgaac tcctgacctc     300
nagtgatctg ccctcctcgg cctcacaaag tgctggaatt acaggcatgg gctgctgcac     360
ccagtcaact tctcactagt tatggcctta tcattttcac cacattctat tggcccaaaa     420
aaaaaaaaan                                                            430
```

<210> 251
<211> 329
<212> DNA
<213> Homo sapien

<400> 251
```
tggtactcca ccatyatggg gtcaaccgcc atcctcgccc tcctcctggc tgttctccaa      60
ggagtctgtg ccgaggtgca gctgrtgcag tctggagcag aggtgaaaaa gtccgggggag    120
tctctgaaga tctcctgtaa gggttctgga tacacctta agatctactg gatcgcctgg      180
gtgcgccagt tgcccgggaa aggcctggag tggatggggc tcatctttcc tgatgactct     240
gataccagat acagcccgtc cttccaaggc caggtcacca tctcagtcga taagtccatc      300
agcaccgcct atctgcagtg gagtaccaa                                       329
```

<210> 252
<211> 536
<212> DNA
<213> Homo sapien

<400> 252
```
tggtactcca ctcagcccaa ccttaattaa gaattaagag ggaacctatt actattctcc      60
caggctcctc tgctctaacc aggcttctgg gacagtatta gaaaaggatg tctcaacaag     120
tatgtagatc ctgtactggc ctaagaagtt aaactgagaa tagcataaat cagaccaaac     180
ttaatggtcg ttgagacttg tgtcctggag cagctgggat aggaaaactt ttgggcagca     240
agaggaagaa ctgcctggaa gggggcatca tgttaaaaat tacaagggga acccacacca     300
ggcccccttc ccagctctca gcctagagta ttagcatttc tcagctagag actcacaact     360
tccttgctta gaatgtgcca ccggggggag tccctgtggg tgatgaggct ctcaagagtg     420
agagtggcat cctatcttct gtgtgcccac aggagcctgg cccgagactt agcaggtgaa     480
gtttctggtc caggctttgc ccttgactca ctatgtgacc tctggtggag taccaa         536
```

<210> 253
<211> 507
<212> DNA
<213> Homo sapien

```
<220>
<221> misc_feature
<222> (1)...(507)
<223> n = A,T,C or G

<400> 253
ntgttgcgat cccagtaact cgggaagctg aggcgggagg atcacctgag ctcaggaggt        60
tgaggccgca gtgagccggg accacgccac tacactccag cctggggcat agagtgagac       120
cctccaagac agaaaagaaa agaaaggaag ggaaagggaa agggaaaagg aaaaggaaaa       180
ggaaaaggaa aaggaaaaga caagacaaaa caagacttga atttggatct cctgacttca       240
attttatgtt ctttctacac cacaattcct ctgcttacta agatgataat ttagaaaccc       300
ctcgttccat tctttacagc aagctggaag tttggtcaag taattacaat aatagtaaca       360
aatttgaata ttatatgcca ggtgtttttc attcctgctc tcacttaatt ctcaccactc       420
tgatataaat acaattgctg ccgggtgtgg tggctcatgc ctgtaatccc ggcactttgg       480
gagaccgagg tgggcggats gcaacaa                                           507


<210> 254
<211> 222
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(222)
<223> n = A,T,C or G

<400> 254
ttggattggt cactgtgagg aagccaaatc ggatccgaga gtcttttct aaaggccagt        60
actggccaca ctttctcctg ccgccttcct caaagctgaa gacacacaga gcaaggcgct       120
tctgttttac tccccaatgg taactccaaa ccatagatgg ttagctnccc tgctcatctt       180
tccacatccc tgctattcag tatagtccgt ggaccaatcc aa                          222


<210> 255
<211> 463
<212> DNA
<213> Homo sapien

<400> 255
tgttgcgatc cataaatgct gaaatggaaa taaacaacat gatgagggag gattaagttg        60
gggagggagc acattaaggt ggccatgaag tttgttggaa gaagtgactt ttgaacaagg       120
ccttggtgtt aagagctgat gagagtgtcc cagacagagg ggccactggt acaatagacg       180
agatgggaga gggcttggaa ggtgtgcgaa ataggaagga gtttgttctg gtatgagtct       240
agtgaacaca gaggcgagag gccctggtgg gtgcagctgg agagttatgc agaataacat       300
taggccctgt gggggactgt agactgtcag caataatcca cagtttggat tttattctaa       360
gagtgatggg aagccgtgga aaggggtta agcaaggagt gaaattatca gatttacagt       420
gataaaaata aattggtctg ctactggggg aaaaaaaaaa aaa                         463


<210> 256
<211> 262
<212> DNA
<213> Homo sapien
```

<400> 256

```
ttggattggt caacctgctc aactctacyt ttcctccttc ttcctaaaaa attaatgaat    60
ccaatacatt aatgccaaaa cccttgggtt ttatcaatat ttctgttaaa aagtattatc    120
cagaactgga cataatacta cataataata cataacaacc ccttcatctg gatgcaaaca    180
tctattaata tagcttaaga tcactttcac tttacagaag caacatcctg ttgatgttat    240
tttgatgttt ggaccaatcc aa                                             262
```

<210> 257
<211> 461
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(461)
<223> n = A,T,C or G

<400> 257

```
gnggnnnnnn nnncaattcg actcngttcc cntggtancc ggtcgacatg gccgcgggat    60
taccgcttgt nnctgggggt gtatggggga ctatgaccgc ttgtagctgg gggtgtatgg    120
gggactatga ccgcttgtag mtggkggtgt atgggggact atgaccgctt gtcgggtggt    180
cggataaacc gacgcaaggg acgtgatcga agctgcgttc ccgctctttc gcatcggtag    240
ggatcatgga cagcaatatc cgcattcgyc tgaaggcgtt cgaccatcgc gtgctcgatc    300
aggcgaccgg cgacatcgcc gacaccgcac gccgtaccgg cgcgctcatc cgcggtccga    360
tcccgcttcc cacgcgcatc gagaagttca cggtcaaccg tggcccgcac gtcgacaaga    420
agtcgcgcga gcagttcgag gtgcgtacct acaagcggtc a                       461
```

<210> 258
<211> 332
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(332)
<223> n = A,T,C or G

<400> 258

```
tgaccgcttg tagctggggg tgtatggggg actacgaccg cttgtagctg ggggtgtatg    60
ggggactatg accgcttgta gctgggggtg tatgggggac tatgaccgct tgtagctggg    120
ggtgtatggg ggactaggac cgcttgtagc tgggggtgta tgggggacta tgaccgcttg    180
tagctggggg tgtatggggg actacgaccg cttgtagctg ggggtgtatg ggggactatg    240
accgcttgta nctgggggtg tatgggggac tatgaccgct tgtgctgcct gggggatggg    300
aggagagttg tggttgggga aaaaaaaaaa aa                                  332
```

<210> 259
<211> 291
<212> DNA
<213> Homo sapien

```
<220>
<221> misc_feature
<222> (1)...(291)
<223> n = A,T,C or G

<400> 259
taccgcttgt gaccgcttgt gaccgcttgt gaccgcttgt gaccgcttgt gaccgcttgt        60
gaccgcttgt gaccgcttgt gaccgcttgt gaccgcttgt gaccgcttgt gaccgcttgt       120
gaccgcttgt gaccgcttgt nacnggggt gtctggggga ctatgannga ntgtnactgg         180
gggtgtctgg gggnctatga nngantgtna cnggggtgt ctgggggact atganngact         240
gtgcnncctg ggggatcnga ggagantngn ggntagngat ggttngggan a                 291


<210> 260
<211> 238
<212> DNA
<213> Homo sapien

<400> 260
taagagggta ctggttaaaa tacaggaaat ctggggtaat gaggcagaga accaggatac        60
tttgaggtca gggatgaaaa ctagaatttt tttctttttt tttgcctgag aaacttgctg       120
ctctgaagag gcccatgtat taattgcttt gatcttcctt ttcttacagc cctttcaagg       180
gcagagccct ccttatcctg aaggaatctt atccttagct atagtatgta ccctctta         238


<210> 261
<211> 746
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(746)
<223> n = A,T,C or G

<400> 261
ttgggcacct tcaatatcaa tagctaacat ttattgagtg tttatcgtat cataaaacac        60
tgttctaagc ctttaaacgt actaattcat ttaatgctca taatcacttt agaaggtggg       120
tactagtatt agtctcattt acagatgcaa catgcaggca cagagaggtt aattaacttg       180
cccaaggtaa cacagctaag aaatagaaaa aatattgaat ctggaaagtt gggcttctgg       240
gtaacccaca gagtcttcaa tgagcctggg gcctcactca gtttgctttt acaaagcgaa       300
tgagtaacat cacttaattc agtgagtagg ccaaatggag gtcagctacg agtttctgct       360
gttcttgcag tggactgaca gatgtttaca acgtctggcc atcagtwaat ggactgatta       420
tcattgggaw gtgggtgggc tgaatgttgg ccagtgaagt ttattcawgc catatttta        480
tgtttaggat gactttggc tggtcctagg gcaagctctg tctgscacgg aacacagaat        540
wacacaggga cccctcaat ttctggtgtg ctagaacca tgaaccactg gttgggggaa         600
caagcggtca aaacctaagt gcggccggct ggcagggtcc acccatatgg ggaaaactcc       660
cnacgcgttt ggaatgcctn agctngaatt attctaanag ttgtccncnt aaaattagcc       720
tgggcgttaa tcagggtcn naagcc                                              746


<210> 262
<211> 588
<212> DNA
```

<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(588)
<223> n = A,T,C or G

<400> 262
```
tgaccgcttg tcatctcaca tggggtcctg cacgcttttg cctttgtagg aaacctgaca      60
tttgtctgtt tcttctttct cttttccttc ccatatcctc ctaatttacg tttgacttgt     120
ttgctgagga ggcaggagct agagactgct gtgagctcat aggggtggga agtttatcct     180
tcaagtcccg cccactcatc actgcttctc accttcccct gaccaggctt acaagtgggt     240
tcttgcctgc tttccctttg gacccaacaa gccctgtaa tgagtgtgca tgactctgac      300
agctgtggac tcaggtcct tggctacagc tgccatgtaa aatatctcat ccagttctcg       360
caaattgtta aaataaccac atttcttaga ttccagtacc caaatcatgt ctttacgaac     420
tgctcctcac acccagaagt ggcacaataa ttcttgggga attattactt ttttttttct     480
ctctnttnnc gnnngnnnng gnnngnccag gaattaccac nttggaagac ctggccngaa     540
tttattatan aggggagccg attnttttttc ctaacacaaa gcgggtca                 588
```

<210> 263
<211> 730
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(730)
<223> n = A,T,C or G

<400> 263
```
tttttttttt tttggcctga gcaactgaaa ttatgaaatt tccatatact caaaagagta      60
agactgcaaa aagattaaat gtaaagttg tcttgtatac agtaatgttt aagataccta       120
ttanatttat aaatggaaaa ttagggcatt tggatataca agttgaaaat tcaggagtga     180
ggttgggctg gctgggtata tactgaaaac tgtcagtaca cagatgacat ctaaaaccac     240
aaatctggtt ttatttttagc agtgatatgt gtcactccca caaaagcctt cccaattggc     300
ctcagcatac acaacaagtc acctccccac agccctctac acataaacaa attccttagt     360
ttagttcagg aggaaatgcg ccctttttcct tccgctctag gtgaccgcaa ggcccagttc    420
tcgtcaccaa gatgttaagg gaagtctgcc aaagaggcat ctgaaaggaa ataaggggaa     480
tgggagtgac cacaaaggaa agccaaggan aaactttgga gaccgttct aganccctgg      540
catttcacaa caaaactcng gaacaaacct tgtctcatca atcatttaag cccttcgttt     600
ggannagact ttctgaactg ggcgctgaac ataancctca ttgaatgtct tcacagtctc     660
ccagctgaag gcacaccttg ggccagaagg ggaatcttcc aggtcctcaa nacagggctc     720
gccctttgnc                                                           730
```

<210> 264
<211> 715
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature

```
<222> (1)...(715)
<223> n = A,T,C or G

<400> 264
tttttttttt tttggccagt atgatagtct ctaccactat attgaagctc ttaggtcatt     60
tacacttaat gtggttatag atgctgttga gcttacttct accaccttgc tatttctccc    120
gtctcttttt tgttcctttt ctcttctttt cctcccttat tttataattg aattttttag    180
gattctattt tatatagatt tatcagctat aacactttgt attcttttgt tttgtggttc    240
ttctgtcatt tcaatgtgca tcttaaactc atcacaatct attttcaaat aatatcatat    300
aaccttacat ataatgtaag aatctaccac catatatttc catttctccc ttccatccta    360
tgtntgtcat atttttcct ttatatatgt tttaaagaca taatagtata tgggaggttt    420
ttgcttaaaa tgtgatcaat attccttcaa ngaaacgtaa aaattcaaaa taaatntctg    480
tttattctca aatnnaccta atatttccta ccatntctna tacntttcaa gaatctgaag    540
gcattggttt tttccggctt aagaacctcc tctaaagcac tctaagcaga attaagtctt    600
ctgggagagg aattctccca agcttgggcc ttnanntgta ctccntnang gttaaanttt    660
ggccgggaaa tagaaattcc aagttaacag gntanttttt ntttttnttn tcncc          715


<210> 265
<211> 152
<212> DNA
<213> Homo sapien


<400> 265
tttttttttt tttcccaaca caaagcacca ttatctttcc tcacaatttt caacatagtt     60
tgattcccat gaagaggtta tgatttctaa agaaaacatg gctactatac tatcaatcag    120
ggttaaatct ttttttttg agacggagtt ta                                   152


<210> 266
<211> 193
<212> DNA
<213> Homo sapien


<220>
<221> misc_feature
<222> (1)...(193)
<223> n = A,T,C or G


<400> 266
taaactccgt ccccttctta atcaatatgg aggctaccca ctccacatta ccttcttttc     60
aagggactgt ttccgtaact gttgtgggta ttcacgacca ggcttctaaa cctcttaaaa    120
ctccccaatt ctggtgccaa cttggacaac atgctttttt tttttttttt tttttttttn    180
gagacggagt tta                                                       193


<210> 267
<211> 460
<212> DNA
<213> Homo sapien


<400> 267
tgttgcgatc ccttaagcat gggtgctatt aaaaaaatgg tggagaagaa aatacctgga     60
atttacgtct tatctttaga gattgggaag accctgatgg aggacgtgga gaacagcttc    120
```

```
ttcttgaatg tcaattccca agtaacaaca gtgtgtcagg cacttgctaa ggatcctaaa       180
ttgcagcaag gctacaatgc tatgggattc tcccagggag gccaatttct gagggcagtg       240
gctcagagat gcccttcacc tcccatgatc aatctgatct cggttggggg acaacatcaa       300
ggtgtttttg gactccctcg atgcccagga gagagctctc acatctgtga cttcatccga       360
aaaacactga atgctggggc gtactccaaa gttgttcagg aacgcctcgt gcaagccgaa       420
tactggcatg acccataaaa ggaggatgtg gatcgcaaca                             460
```

```
<210> 268
<211> 533
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(533)
<223> n = A,T,C or G

<400> 268
tgttgcgatc cgttgataga atagcgacgt ggtaatgagt gcatggcacg cctccgactt        60
accttcgccc gtggggaccc cgagtacgtc tacggcgtcg tcacttagag taccctctgg       120
acgcccgggc gcgttcgatt taccggaagc gcgagctgca gtgggcttgc gcccccggcc       180
aaattctttg ggggtttaa ggccgcgggg aatttgaggt atctctatca gtatgtagcc        240
aagttggaac agtcgccatt cccgaaatcg ctttctttga atccgcaccg cctccagcat       300
tgcctcattc atcaacctga aggcacgcat aagtgacggt tgtgtcttca gcagctccac       360
tccataacta gcgcgctcga cctcgtcttc gtacgcgcca ggtccgtgcg tgcgaattcc       420
caactccggt gagttgcgca tttcaagttn cgaaactgtt cgcctccacn atttggcatg       480
ttcacgcatg acacggaata aactcgtcca gtaccgggaa tgggatcgca aca             533
```

```
<210> 269
<211> 50
<212> DNA
<213> Homo sapien

<400> 269
ttttttttttt ttcgcctgaa ttagctacag atcctcctca caagcggtca                 50
```

```
<210> 270
<211> 519
<212> DNA
<213> Homo sapien

<400> 270
tgttgcgatc caaataaccc accagcttct tgcacacttc gcagaagcca ccgtcctttg        60
gctgagtcac gtgaacggtc agtgcaagca gccgcgtgcc agagcagagg tgcagcatgc       120
tgcacaccag ctcagggctg acctcctcca gcaggatgga caggatggag ctgccgtacg       180
tgtccaccac ctcctggcac tcttccgaca gggacttcgg cagcttcgag cacattttgt       240
caaaagcgtc gagtatttct ttctcagtct tgttgttgtc aatcagcttg gtcacctcct       300
tcaccaggaa ttcacacacc tcacagtaaa catcagactt tgctgggacc tcgtgcttct       360
taatgggctc caccagttcc agggcaggga tgacattctt ggaggccact ttggcggggga      420
ccagagtctg catgggcatc tctttcacct catcacagaa cccaaccagc gcacagatct       480
ccttgggttg catgtgcatc atcatctggg atcgcaaca                              519
```

```
<210> 271
<211> 457
<212> DNA
<213> Homo sapien

<400> 271
tttttttttt ttcgggcggc gaccggacgt gcactcctcc agtagcggct gcacgtcgtg      60
ccaatggccc gctatgagga ggtgagcgtg tccggcttcg aggagttcca ccgggccgtg     120
gaacagcaca atggcaagac cattttcgcc tactttacgg gttctaagga cgccggggggg    180
aaaagctggt gccccgactg cgtgcaggct gaaccagtcg tacgagaggg gctgaagcac     240
attagtgaag gatgtgtgtt catctactgc caagtaggag aagagcctta ttggaaagat     300
ccaaataatg acttcagaaa aaacttgaaa gtaacagcag tgcctacact acttaagtat     360
ggaacacctc aaaaactggt agaatctgag tgtcttcagg ccaacctggt ggaaatgttg     420
ttctctgaag attaagattt taggatggca atcaaga                             457


<210> 272
<211> 102
<212> DNA
<213> Homo sapien

<400> 272
tttttttttt ttgggcaaca acctgaatac cttttcaagg ctctggcttg ggctcaagcc      60
cgcaggggaa atgcaactgg ccaggtcaca gggcaatcaa ga                        102


<210> 273
<211> 455
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(455)
<223> n = A,T,C or G

<400> 273
tttttttttt ttggcaatca acaggtttaa gtcttcggcc gaagttaatc tcgtgttttt      60
ggcaatcaac aggtttaagt cttcggccga agttaatctc gtgttttggg caatcaacag     120
gtttaagtct tcggccgaag ttaatctcgt gtttttggca atcaacaggt ttaagtcttc     180
ggccgaagtt aatctcgtgt ttttggcaat caacaggttt aagtcttcgg ccgaagttaa     240
tctcgtgttt ttggcaatca acaggtttaa gtcttcggcc gaagttaatc tcgtgttttt     300
ggcaatcaag aggtttaagt cttcggccga agttaatctc gtgtttttgg caatcaacag     360
gtttaagtct tcggccgaan ttaatctcgt gtttttggca atcaacaggt ttaantcttc     420
ggccgaagtt aatctcgtgt ttttggcaat caana                               455


<210> 274
<211> 461
<212> DNA
<213> Homo sapien

<400> 274
```

```
tttttttttt ttggccaata cccttgatga acatcaatgt gaaaatcctc ggtaaaatac    60
tggcaaacca aatccagcag cacatcaaaa agcttatcca ccatgatcaa gtgggcttca   120
tccctgggat gcaaggctgg ttcaacataa gaaaatcaat aaatgtaatc catcacataa   180
acagaaccaa agacaaaaac cacatgatta tctcaataga tgcagaaaag gccttggaca   240
aattcaacag cccttcatgc taaacactct taataaacta gatattgatg gaatgtatct   300
caaaataata agagctattt atgacaaacc cacagccaat atcatactga atgggcaaag   360
actggaagca ttccctttga aaactggcac aagacaagga tgccctctct caccgctcct   420
attcaacata gtattggaag ttctggccag ggcaatcaag a                       461
```

        <210> 275
        <211> 729
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(729)
        <223> n = A,T,C or G

        <400> 275
```
tttttttttt ttggccaaca ccaagtcttc cacgtgggag gttttattat gttttacaac    60
catgaaaaca taggaaggtg gctgttacag caaacatttc agatagacga atcggccaag   120
ctccccaaac cccaccttca cagcctcttc cacacgtctc ccanagattg ttgtccttca   180
cttgcaaatt canggatgtt ggaagtngac atttnnagtn gcnggaaccc catcagtgaa   240
ncantaagca gaantacgat gactttgana nacanctgat gaagaacacn ctacnganaa   300
cccttctctnt cgtgttanga tctcnngtcc ntcactaatg cggcccctg cnggtccacc   360
atttgggaga actcccccn cgttggatcc cccttgagt ntcccattct ngtcccccan   420
accngncttg ngngncantn cnncctcnca cntgtttcc ctgnngtaa aatnngtttt   480
nccgccnccc naattcccac ccnaatcaca gcgaancng aaggccttcn naagtgttta   540
angcccngng gtttcctcnt ntanttgcag cctaccctcc cncttnnnnt tncgngttgg   600
tcgcgccctg gncncgcctn gttcctcttt nnggnnacaa cctngntcnn nggcncntcn   660
nnnctnttcc tnnnactagc tngcctntcc ncnccgnggn ncanngcaca ttncncnnac   720
tntgtnncc                                                           729
```

        <210> 276
        <211> 339
        <212> DNA
        <213> Homo sapien

        <400> 276
```
tgacctgaca tgtagtagat acttaataaa tatttgtgga atgaatggat gaagtggagt    60
tacagagaaa aatagaaaag tacaaattgt tgtcagtgtt ttgaaggaaa attatgatct   120
ttcccaaagt tctgacttca ttctaagaca gggttagtat ctccatacat aattttactt   180
gcttttgaaa atcaaatgag ataatctatt tagattgata atttatttag actggctata   240
aactattaag tgctagcaaa tatacatttt aatctcattt tccacctctt gtgatatagc   300
tatgtaggtg ttgactttaa tggatgtcag gtcaatccc                          339
```

        <210> 277
        <211> 664
        <212> DNA
        <213> Homo sapien

```
<220>
<221> misc_feature
<222> (1)...(664)
<223> n = A,T,C or G

<400> 277
tgacctgaca tccataacaa aatctttctc cattatattc ttctagggga atttcttgaa      60
aagcatccaa aggaaacaaa tgatggtaag accgtgccaa gtggggagca gacaccaaag     120
taagaccaca gattttacat tcaacaggta gctcacagta ctttgcccga cactgtgggc     180
agaaatagcc tcctaatgta agccctggct cagtattgcc atccaaatgc gccatgctga     240
aagagggttt tgcatcctgg tcagatnaag aagcaatggt gtgctgagga aatcccatac     300
gaataagtga gcattcagaa cttgagctag caggaggagg actaagatga tgtgtgagca     360
actctttgta atggctttca tctaaaataa catggtacgt gccaccagtt tcacgagcaa     420
gtacagtgca aacgcgaact tctgcagaca atccaataac agatactcta attttagctg     480
cctttagggt cttgattaaa tcataaatat tagatggatc gcaagttgta aggntgctaa     540
aagatgatta gtacttctcg acttgtatgt ccaggcatgt tgttttaaan tctgccttag     600
nccctgctta ggggaatttt taaagaagat ggctctccat gttcanggtc aatcacnaat     660
tgcc                                                                  664


<210> 278
<211> 452
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(452)
<223> n = A,T,C or G

<400> 278
tgacctgaca ttgaggaaga gcacacacct ctgaaattcc ttaggttcag aagggcattt      60
gacacagagt gggcctctga taattcatga aatgcattct gaagtcatcc agaatggagg     120
ctgcaatctg ctgtgctttg ggggttgcct cactgtgctc ctggatatca cacaaaagct     180
gcaatccttc ttcttcaact aacattttgc agtatttgct gggattttta ctgcagacat     240
gatacatagc ccatagtgcc cagagctgaa cctctggttg agagaagttg ccaaggagcg     300
ggaaaaatgt cttgaaagat ctataggtca ccaatgctgt catcttacaa cttgaacttg     360
gccaattctg tatggttgca tgcagatctt ggagaagagt acgcctctgg aagtcacggg     420
atatccaaan ctgtctgtca gatgtcaggt ca                                   452


<210> 279
<211> 274
<212> DNA
<213> Homo sapien

<400> 279
tttttttttt ttcggcaagg caaatttact tctgcaaaag ggtgctgctt gcacttttgg      60
ccactgcgag agcacaccaa acaaagtagg gaagggtttt ttatccctaa cgcggttatt     120
ccctggttct gtgtcgtgtc cccattggct ggagtcagac tgcacaatct acactgaccc     180
aactggctac tgtttaaaat tgaatatgaa taattaggta ggaaggggga ggctgtttgt     240
tacggtacaa gacgtgtttg ggcatgtcag gtca                                 274
```

```
<210> 280
<211> 272
<212> DNA
<213> Homo sapien

<400> 280
tacctgacat ggagaaataa cttgtagtat tttgcgtgca atggaatact atatgagggt         60
gaaaatgaat gaactagcaa tgcgtgtatc aacatgaata aatccccaaa acataataat        120
gttgaatgga aaaggtgagt ttcagaagga tatatatgcc ctctaaatcc atttatgtaa        180
acctttaaaa aactacatta tttatggtca taagtccatc cagaaaatat ttaaaaacct        240
acatgggatt gataactact gatgtcaggt ca                                       272


<210> 281
<211> 431
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(431)
<223> n = A,T,C or G

<400> 281
tttttttttt ttggccaata gcatgattta aacattggaa aaagtcaaat gagcaatgcg         60
aatttttatg ttctcttgaa taatcaaaag agtaggcaac attggttcct cattcttgaa        120
tagcattaat cagaaaatat tgcatagcct ctagcctcct tagagtaggt gtgctctctc        180
aaatatatca tagtcccaca gtttatttca tgtatatttt ctgcctgaat cacatagaca        240
tttgaatttg caacgcctga tgtaaatata taaattctta ccaatcagaa acatagcaag        300
aaattcaggg acttggtcat yatcagggta tgacagcana tccctgtara aacactgata        360
cacactcaca cacgtatgca acgtggagat gtcgcyttww kkktwywcwm rmrycrwcgn        420
aatcacttan n                                                              431


<210> 282
<211> 98
<212> DNA
<213> Homo sapien

<400> 282
attcgattcg atgcttgagc ccaggagttc aagactgcag tgagccactg cacttcaggc         60
tggacaacag agcgagtccc tgtgccaaaa aaaaaaaa                                  98


<210> 283
<211> 764
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(764)
<223> n = A,T,C or G
```

<400> 283

```
ttttttttttt ttcgcaagca cgtgcacttt attgaatgac actgtagaca ggtgtgtggg        60
tataaactgc tgtatctagg ggcaggacca aggggggcagg ggcaacagcc ccagcgtgca      120
gggccascat tgcacagtgg astgcaaagg ttgcaggcta tgggcggcta ctavtaaccc      180
cgttttttcct gtattatctg taacataata tggtagactg tcacagagcc gaatwccart      240
hacasgatga atccaawggt caygaggatg cccasaatca gggcccasat sttcaggcac      300
ttggcggtgg gggcatasgc ctgkgccccg gtcacgtcsc caaccwtcty cctgtcccta      360
cmcttgawtc cncnccttnn nntnccntna tntgcccgcc cncctcctng ngtcaaccng      420
natctgcact anctccctcn cccccttntgg antctcntcc ttcaantaan nttatccttn      480
acncccccct cnccttnccc ctnccncccn tnatcccngn nccnctatca ntcntnccct      540
cnctntnctn cnnatcgttc cnccctnntaa ctacnctttn nacnanncct cactnatncc      600
ngnnanttct ttccttccct cccnacgcnn tgcgtgcgcc cgtctngcct nnnctncgna      660
cccnnacttt atttacctttt ncaccctagc nctctacttn acccanccnc tcctacctcc      720
nggnccaccc nncccctnatc nctnnctctn tcnnctcntt cccc                      764
```

<210> 284
<211> 157
<212> DNA
<213> Homo sapien

<400> 284

```
caagtgtagg cacagtgatg aaagcctgga gcaaacacaa tctgtgggta attaacgttt        60
atttctcccc ttccaggaac gtcttgcatg gatgatcaaa gatcagctcc tggtcaacat      120
aaataagcta gtttaagata cgttcccctta cacttga                               157
```

<210> 285
<211> 150
<212> DNA
<213> Homo sapien

<400> 285

```
attcgattgt actcagacaa caatatgcta agtggaagaa gtcagtcaca aaagaccaca        60
tactgtatga cttcatttac attaagtgtc cagaataggc aaatccgtag agacagaaag      120
tagatgagca gctgcctagg tctgagtaca                                         150
```

<210> 286
<211> 219
<212> DNA
<213> Homo sapien

<400> 286

```
attcgatttt ttttttttg gccatgatga aattcttact ccctcagatt ttttgtctgg        60
ataaatgcaa gtctcaccac cagatgtgaa attacagtaa actttgaagg aatctcctga      120
gcaaccttgg ttaggatcaa tccaatattc accatctggg aagtcaggat ggctgagttg      180
caggtctttta caagttcggg ctggattggt ctgagtaca                             219
```

<210> 287
<211> 196
<212> DNA
<213> Homo sapien

<400> 287

```
attcgattct tgaggctacc aggagctagg agaagaggca tggaacaaat tttccctcat      60
atccatactc agaaggaacc aaccctgctg acaccttaat ttcagcttct ggcctctaga     120
actgtgagag agtacatttc tcttggttta agccaagaga atctgtcttt tggtacttta     180
tatcatagcc tcaaga                                                     196
```

<210> 288
<211> 199
<212> DNA
<213> Homo sapien

<400> 288

```
attcgatttc agtccagtcc cagaacccac attgtcaatt actactctgt araagattca      60
tttgttgaaa ttcattgagt aaaacattta tgatccctta atatatgcca attaccatgc     120
taggtactga agattcaagt gaccgagatg ctagcccttg ggttcaagtg atccctctcc     180
cagagtgcac tggactgaa                                                  199
```

<210> 289
<211> 182
<212> DNA
<213> Homo sapien

<400> 289

```
attcgattct tgaggctaca aacctgtaca gtatgttact ctactgaata ctgtaggcaa      60
tagtaataca gaagcaagta tctgtatatg taaacattaa aaaggtacag tgaaacttca     120
gtattataat cttagggacc accattatat atgtggtcca tcattggcca aaaaaaaaaa     180
aa                                                                    182
```

<210> 290
<211> 1646
<212> DNA
<213> Homo sapien

<400> 290

```
ggcacgagga gaaatgtaat tccatatttt atttgaaact tattccatat tttaattgga      60
tattgagtga ttgggttatc aaacacccac aaactttaat tttgttaaat ttatatggct     120
ttgaaataga agtataagtt gctaccattt tttgataaca ttgaaagata gtattttacc     180
atctttaatc atcttggaaa atacaagtcc tgtgaacaac cactctttca cctagcagca     240
tgaggccaaa agtaaaggct ttaaattata acatatggga ttcttagtag tatgtttttt     300
tcttgaaact cagtggctct atctaacctt actatctcct cactctttct ctaagactaa     360
actctaggct cttaaaaatc tgcccacacc aatcttagaa gctctgaaaa gaatttgtct     420
ttaaatatct tttaatagta acatgtattt tatggaccaa attgacattt cgactatttt     480
tttccaaaaa agtcaggtga atttcagcac actgagttgg gaatttctta tcccagaaga     540
ccaaccaatt tcatatttat ttaagattga ttccatactc cgttttcaag gagaatccct     600
gcagtctcct taaaggtaga acaaatactt tctatttttt tttcaccatt gtgggattgg     660
actttaagag gtgactctaa aaaaacagag aacaaatatg tctcagttgt attaagcacg     720
gacccatatt atcatattca cttaaaaaaa tgatttcctg tgcacctttt ggcaacttct     780
cttttcaatg tagggaaaaa cttagtcacc ctgaaaaccc acaaaataaa taaaacttgt     840
agatgtgggc agaaggtttg ggggtggaca ttgtatgtgt ttaaattaaa ccctgtatca     900
ctgagaagct gttgtatggg tcagagaaaa tgaatgctta gaagctgttc acatcttcaa     960
```

```
gagcagaagc aaaccacatg tctcagctat attattattt attttttatg cataaagtga    1020
atcatttctt ctgtattaat ttccaaaggg tttttaccctc tatttaaatg ctttgaaaaa    1080
cagtgcattg acaatgggtt gatatttttc tttaaaagaa aaatataatt atgaaagcca    1140
agataatctg aagcctgttt tattttaaaa ctttttatgt tctgtggttg atgttgtttg    1200
tttgtttgtt tctattttgt tggtttttta ctttgttttt tgttttgttt tgttttgttt    1260
kgcatactac atgcagttct ttaaccaatg tctgtttggc taatgtaatt aaagttgtta    1320
atttatatga gtgcatttca actatgtcaa tggtttctta atatttattg tgtagaagta    1380
ctggtaattt ttttatttac aatatgttta aagagataac agtttgatat gttttcatgt    1440
gtttatagca gaagttattt atttctatgg cattccagcg gatattttgg tgtttgcgag    1500
gcatgcagtc aatattttgt acagttagtg gacagtattc agcaacgcct gatagcttct    1560
ttggccttat gttaaataaa aagacctgtt tgggatgtat tttttatttt taaaaaaaaa    1620
aaaaaaaaaa aaaaaaaaaa aaaaa                                          1646
```

```
tcatcaccat tgccagcagc ggcaccgtta gtcaggtttt ctgggaatcc cacatgagta      60
cttccgtgtt cttcattctt cttcaatagc cataaatctt ctagctctgg ctggctgttt     120
tcacttcctt taagcctttg tgactcttcc tctgatgtca gctttaagtc ttgttctgga     180
ttgctgtttt cagaagagat ttttaacatc tgttttcctt tgtagtcaga aagtaactgg     240
caaattacat gatgatgact agaaacagca tactctctgg ccgtctttcc agatcttgag     300
aagatacatc aacattttgc tcaagtagag ggctgactat acttgctgat ccacaacata     360
cagcaagtat gagagcagtt cttccatatc tatccagcgc atttaaattc gctttttttct     420
tgattaaaaa tttcaccact tgctgttttt gctcatgtat accaagtagc agtggtgtga     480
ggccatgctt gtttttttgat tcgatatcag caccgtataa gagcagtgct ttggccatta     540
atttatcttc attgtagaca gcatagtgta gagtggtatt tccatactca tctggaatat     600
ttggatcagt gccatgttcc agcaacatta acgcacattc atcttcctgg cattgtacgg     660
cctttgtcag agctgtcctc tttttgttgt caaggacatt aagttgacat cgtctgtcca     720
gcacgagttt tactacttct gaattcccat tggcagaggc cagatgtaga gcagtcctct     780
tttgcttgtc cctcttgttc acatccgtgt ccctgagcat gacgatgaga tcctttctgg     840
ggactttacc ccaccaggca gctctgtgga gcttgtccag atcttctcca tggacgtggt     900
acctgggatc catgaaggcg ctgtcatcgt agtctcccca agcgaccacg ttgctcttgc     960
cgctcccctg cagcagggga agcagtggca gcaccacttg cacctcttgc tcccaagcgt    1020
cttcacagag gagtcgttgt ggtctccaga agtgcccacg ttgctcttgc cgctcccccct   1080
gtccatccag ggaggaagaa atgcaggaaa tgaaagatgc atgcacgatg gtatactcct    1140
cagccatcaa acttctggac agcaggtcac ttccagcaag gtggagaaag ctgtccaccc    1200
acagaggatg agatccagaa accacaatat ccattcacaa acaaacactt ttcagccaga    1260
cacaggtact gaaatcatgt catctgcggc aacatggtgg aacctaccca atcacacatc    1320
aagagatgaa gacactgcag tatatctgca caacgtaata ctcttcatcc ataacaaaat    1380
aatataattt tcctctggag ccatatggat gaactatgaa ggaagaactc cccgaagaag    1440
ccagtcgcag agaagccaca ctgaagctct gtcctcagcc atcagcgcca cggacaggar    1500
tgtgtttctt ccccagtgat gcagcctcaa gttatcccga agctgccgca gcacacggtg    1560
gctcctgaga aacaccccag ctcttccggt ctaacacagg caagtcaata aatgtgataa    1620
tcacataaac agaattaaaa gcaaagtcac ataagcatct caacagacac agaaaaggca    1680
tttgacaaaa tccagcatcc ttgtatttat tgttgcagtt ctcagaggaa atgcttctaa    1740
cttttcccca tttagtatta tgttggctgt gggcttgtca taggtggttt ttattacttt    1800
aaggtatgtc ccttctatgc ctgtttttgct gagggtttta attctcgtgc c           1851
```

<210> 292
<211> 1851
<212> DNA
<213> Homo sapien

<400> 292
```
tcatcaccat tgccagcagc ggcaccgtta gtcaggtttt ctgggaatcc cacatgagta      60
cttccgtgtt cttcattctt cttcaatagc cataaatctt ctagctctgg ctggctgttt     120
tcacttcctt taagcctttg tgactcttcc tctgatgtca gctttaagtc ttgttctgga     180
ttgctgtttt cagaagagat ttttaacatc tgttttctt tgtagtcaga aagtaactgg      240
caaattacat gatgatgact agaaacagca tactctctgg ccgtctttcc agatcttgag     300
aagatacatc aacattttgc tcaagtagag ggctgactat acttgctgat ccacaacata     360
cagcaagtat gagagcagtt cttccatatc tatccagcgc atttaaattc gcttttttct     420
tgattaaaaa tttcaccact tgctgttttt gctcatgtat accaagtagc agtggtgtga     480
ggccatgctt gtttttgat tcgatatcag caccgtataa gagcagtgct ttggccatta      540
atttatcttc attgtagaca gcatagtgta gagtggtatt ccatactca tctggaatat      600
ttggatcagt gccatgttcc agcaacatta acgcacattc atcttcctgg cattgtacgg     660
cctttgtcag agctgtcctc tttttgttgt caaggacatt aagttgacat cgtctgtcca     720
gcacgagttt tactacttct gaattcccat tggcagaggc cagatgtaga gcagtcctct     780
tttgcttgtc cctcttgttc acatccgtgt ccctgagcat gacgatgaga tcctttctgg     840
ggactttacc ccaccaggca gctctgtgga gcttgtccag atcttctcca tggacgtggt     900
acctgggatc catgaaggcg ctgtcatcgt agtctcccca agcgaccacg ttgctcttgc     960
cgctcccctg cagcagggga agcagtggca gcaccacttg cacctcttgc tcccaagcgt    1020
cttcacagag gagtcgttgt ggtctccaga agtgcccacg ttgctcttgc cgctcccct    1080
gtccatccag ggaggaagaa atgcaggaaa tgaaagatgc atgcacgatg gtatactcct    1140
cagccatcaa acttctggac agcaggtcac ttccagcaag gtggagaaag ctgtccaccc    1200
acagaggatg agatccagaa accacaatat ccattcacaa acaaacactt ttcagccaga    1260
cacaggtact gaaatcatgt catctgcggc aacatggtgg aacctaccca atcacacatc    1320
aagagatgaa gacactgcag tatatctgca caacgtaata ctcttcatcc ataacaaat    1380
aatataattt tcctctggag ccatatggat gaactatgaa ggaagaactc cccgaagaag    1440
ccagtcgcag agaagccaca ctgaagctct gtcctcagcc atcagcgcca cggacaggar    1500
tgtgtttctt ccccagtgat gcagcctcaa gttatcccga agctgccgca gcacacggtg    1560
gctcctgaga aacaccccag ctcttccggt ctaacacagg caagtcaata aatgtgataa    1620
tcacataaac agaattaaaa gcaaagtcac ataagcatct caacagacac agaaaaggca    1680
tttgacaaaa tccagcatcc ttgtatttat tgttgcagtt ctcagaggaa atgcttctaa    1740
cttttcccca tttagtatta tgttggctgt gggcttgtca taggtggttt ttattactt    1800
aaggtatgtc ccttctatgc ctgttttgct gagggtttta attctcgtgc c             1851
```

<210> 293
<211> 668
<212> DNA
<213> Homo sapien

<400> 293
```
cttgagcttc caaataygga agactggccc ttacacasgt caatgttaaa atgaatgcat      60
ttcagtattt tgaagataaa attrgtagat ctataccttg tttttgatt cgatatcagc     120
accrtataag agcagtgctt tggccattaa tttatctttc attrtagaca gcrtagtgya     180
gagtggtatt ccatactca tctggaatat ttggatcagt gccatgttcc agcaacatta     240
acgcacattc atcttcctgg cattgtacgg cctgtcagta ttagacccaa aaacaaatta     300
catatcttag gaattcaaaa taacattcca cagctttcac caactagtta tatttaaagg     360
agaaaactca tttttatgcc atgtattgaa atcaaaccca cctcatgctg atatagttgg     420
```

```
ctactgcata cctttatcag agctgtcctc tttttgttgt caaggacatt aagttgacat      480
cgtctgtcca gcaggagttt tactacttct gaattcccat tggcagaggc cagatgtaga      540
gcagtcctat gagagtgaga agacttttta ggaaattgta gtgcactagc tacagccata      600
gcaatgattc atgtaactgc aaacactgaa tagcctgcta ttactctgcc ttcaaaaaaa      660
aaaaaaaa                                                               668


        <210> 294
        <211> 1512
        <212> DNA
        <213> Homo sapien

        <400> 294
gggtcgccca gggggsgcgt gggctttcct cgggtgggtg tgggttttcc ctgggtgggg       60
tgggctgggc trgaatcccc tgctgggggtt ggcaggtttt ggctgggatt gacttttytc      120
ttcaaacaga ttggaaaccc ggagttacct gctagttggt gaaactggtt ggtagacgcg      180
atctgttggc tactactggc ttctcctggc tgttaaaagc agatggtggt tgaggttgat      240
tccatgccgg ctgcttcttc tgtgaagaag ccatttggtc tcaggagcaa gatgggcaag      300
tggtgctgcc gttgcttccc ctgctgcagg gagagcggca agagcaacgt gggcacttct      360
ggagaccacg acgactctgc tatgaagaca ctcaggagca agatgggcaa gtggtgccgc      420
cactgcttcc cctgctgcag ggggagtggc aagagcaacg tgggcgcttc tggagaccac      480
gacgaytctg ctatgaagac actcaggaac aagatgggca agtggtgctg ccactgcttc      540
ccctgctgca ggggggagcrg caagagcaag gtgggcgctt ggggagacta cgatgacagt      600
gccttcatgg agcccaggta ccacgtccgt ggagaagatc tggacaagct ccacagagct      660
gcctggtggg gtaaagtccc cagaaaggat ctcatcgtca tgctcaggga cactgacgtg      720
aacaagaagg acaagcaaaa gaggactgct ctacatctgg cctctgccaa tgggaattca      780
gaagtagtaa aactcstgct ggacagacga tgtcaactta atgtccttga caacaaaaag      840
aggacagctc tgayaaaggc cgtacaatgc caggaagatg aatgtgcgtt aatgttgctg      900
gaacatggca ctgatccaaa tattccagat gagtatggaa ataccactct rcactaygct      960
rtctayaatg aagataaatt aatggccaaa gcactgctct tatayggtgc tgatatcgaa     1020
tcaaaaaaca aggtatagat ctactaattt tatcttcaaa atactgaaat gcattcattt     1080
taacattgac gtgtgtaagg gccagtcttc cgtatttgga agctcaagca taacttgaat     1140
gaaaatattt tgaaatgacc taattatctm agactttatt ttaaatattg ttattttcaa     1200
agaagcatta gagggtacag tttttttttt ttaaatgcac ttctggtaaa tacttttgtt     1260
gaaaacactg aatttgtaaa aggtaatact tactatttt caatttttcc ctcctaggat     1320
ttttttcccc taatgaatgt aagatggcaa aatttgccct gaaataggtt ttacatgaaa     1380
actccaagaa aagttaaaca tgtttcagtg aatagagatc ctgctccttt ggcaagttcc     1440
taaaaaacag taatagatac gaggtgatgc gcctgtcagt ggcaaggttt aagatatttc     1500
tgatctcgtg cc                                                        1512


        <210> 295
        <211> 1853
        <212> DNA
        <213> Homo sapien

        <400> 295
gggtcgccca gggggsgcgt gggctttcct cgggtgggtg tgggttttcc ctgggtgggg       60
tgggctgggc trgaatcccc tgctgggggtt ggcaggtttt ggctgggatt gacttttytc      120
ttcaaacaga ttggaaaccc ggagttacct gctagttggt gaaactggtt ggtagacgcg      180
atctgttggc tactactggc ttctcctggc tgttaaaagc agatggtggt tgaggttgat      240
tccatgccgg ctgcttcttc tgtgaagaag ccatttggtc tcaggagcaa gatgggcaag      300
tggtgctgcc gttgcttccc ctgctgcagg gagagcggca agagcaacgt gggcacttct      360
```

```
ggagaccacg acgactctgc tatgaagaca ctcaggagca agatgggcaa gtggtgccgc        420
cactgcttcc cctgctgcag ggggagtggc aagagcaacg tgggcgcttc tggagaccac        480
gacgaytctg ctatgaagac actcaggaac aagatgggca agtggtgctg ccactgcttc
540ccctgctgca gggggagcrg caagagcaag gtgggcgctt ggggagacta cgatgacagy        600
gccttcatgg akcccaggta ccacgtccrt ggagaagatc tggacaagct ccacagagct        660
gcctggtggg gtaaagtccc cagaaaggat ctcatcgtca tgctcaggga cackgaygtg        720
aacaagargg acaagcaaaa gaggactgct ctacatctgg cctctgccaa tgggaattca        780
gaagtagtaa aactcstgct ggacagacga tgtcaactta atgtccttga caacaaaaag        840
aggacagctc tgayaaaggc cgtacaatgc caggaagatg aatgtgcgtt aatgttgctg        900
gaacatggca ctgatccaaa tattccagat gagtatggaa ataccactct rcactaygct        960
rtctayaatg aagataaatt aatggccaaa gcactgctct tatayggtgc tgatatcgaa       1020
tcaaaaaaca agcatggcct cacaccactg ytacttggtr tacatgagca aaaacagcaa       1080
gtsgtgaaat ttttaatyaa gaaaaaagcg aatttaaaat gcrctggata gatatggaag       1140
ractgctctc atacttgctg tatgttgtgg atcagcaagt atagtcagcc ytctacttga       1200
gcaaaatrtt gatgtatctt ctcaagatct ggaaagacgg ccagagagta tgctgtttct       1260
agtcatcatc atgtaatttg ccagttactt tctgactaca aagaaaaaca gatgttaaaa       1320
atctcttctg aaaacagcaa tccagaacaa gacttaaagc tgacatcaga ggaagagtca       1380
caaaggctta aggaagtga aaacagccag ccagaggcat ggaaactttt aaatttaaac       1440
ttttggttta atgttttttt tttttgcctt aataatatta gatagtccca aatgaaatwa       1500
cctatgagac taggctttga gaatcaatag attctttttt taagaatctt ttggctagga       1560
gcggtgtctc acgcctgtaa ttccagcacc ttgagaggct gaggtgggca gatcacgaga       1620
tcaggagatc gagaccatcc tggctaacac ggtgaaaccc catctctact aaaaatacaa       1680
aaacttagct gggtgtggtg gcgggtgcct gtagtcccag ctactcagga rgctgaggca       1740
ggagaatggc atgaacccgg gaggtggagg ttgcagtgag ccgagatccg ccactacact       1800
ccagcctggg tgacagagca agactctgtc tcaaaaaaaa aaaaaaaaa aaa              1853
```

```
    <210> 296
    <211> 2184
    <212> DNA
    <213> Homo sapien

    <400> 296
ggcacgagaa ttaaaaccct cagcaaaaca ggcatagaag ggacatacct taaagtaata         60
aaaaccacct atgacaagcc cacagccaac ataatactaa atggggaaaa gttagaagca        120
tttcctctga gaactgcaac aataaataca aggatgctgg attttgtcaa atgccttttc        180
tgtgtctgtt gagatgctta tgtgactttg cttttaattc tgtttatgtg attatcacat        240
ttattgactt gcctgtgtta gaccggaaga gctggggtgt ttctcaggag ccaccgtgtg        300
ctgcggcagc ttcgggataa cttgaggctg catcactggg gaagaaacac aytcctgtcc        360
gtggcgctga tggctgagga cagagcttca gtgtggcttc tctgcgactg gcttcttcgg        420
ggagttcttc cttcatagtt catccatatg gctccagagg aaaattatat tattttgtta        480
tggatgaaga gtattacgtt gtgcagatat actgcagtgt cttcatctct tgatgtgtga        540
ttgggtaggt tccaccatgt tgccgcagat gacatgattt cagtacctgt gtctggctga        600
aaagtgtttg tttgtgaatg gatattgtgg tttctggatc tcatcctctg tgggtggaca        660
gctttctcca ccttgctgga agtgacctgc tgtccagaag tttgatggct gaggagtata        720
ccatcgtgca tgcatctttc atttcctgca tttcttcctc cctggatgga caggggagc        780
ggcaagagca acgtgggcac ttctggagac cacaacgact cctctgtgaa gacgcttggg        840
agcaagaggt gcaagtggtg ctgccactgc ttcccctgct gcagggggagc ggcaagagca        900
acgtggtcgc ttggggagac tacgatgaca gcgccttcat ggatcccagg taccacgtcc        960
atggagaaga tctggacaag ctccacagag ctgcctggtg gggtaaagtc cccagaaagg       1020
atctcatcgt catgctcagg gacacggatg tgaacaagag ggacaagcaa aagaggactg       1080
ctctacatct ggcctctgcc aatgggaatt cagaagtagt aaaactcgtg ctggacagac       1140
```

```
gatgtcaact taatgtcctt gacaacaaaa agaggacagc tctgacaaag gccgtacaat       1200
gccaggaaga tgaatgtgcg ttaatgttgc tggaacatgg cactgatcca aatattccag       1260
atgagtatgg aaataccact ctacactatg ctgtctacaa tgaagataaa ttaatggcca       1320
aagcactgct cttatacggt gctgatatcg aatcaaaaaa caagcatggc ctcacaccac       1380
tgctacttgg tatacatgag caaaaacagc aagtggtgaa atttttaatc aagaaaaaag       1440
cgaatttaaa tgcgctggat agatatggaa gaactgctct catacttgct gtatgttgtg       1500
gatcagcaag tatagtcagc cctctacttg agcaaaatgt tgatgtatct tctcaagatc       1560
tggaaagacg gccagagagt atgctgtttc tagtcatcat catgtaattt gccagttact       1620
ttctgactac aaagaaaaac agatgttaaa aatctcttct gaaaacagca atccagaaca       1680
agacttaaag ctgacatcag aggaagagtc acaaaggctt aaaggaagtg aaaacagcca       1740
gccagaggca tggaaacttt taaatttaaa cttttggttt aatgtttttt tttttgcct       1800
taataatatt agatagtccc aaatgaaatw acctatgaga ctaggctttg agaatcaata       1860
gattctttt ttaagaatct tttggctagg agcggtgtct cacgcctgta attccagcac       1920
cttgagaggc tgaggtgggc agatcacgag atcaggagat cgagaccatc ctggctaaca       1980
cggtgaaacc ccatctctac taaaaataca aaaacttagc tgggtgtggt ggcgggtgcc       2040
tgtagtccca gctactcagg argctgaggc aggagaatgg catgaacccg ggaggtggag       2100
gttgcagtga gccgagatcc gccactacac tccagcctgg gtgacagagc aagactctgt       2160
ctcaaaaaaa aaaaaaaaaa aaaa                                             2184
```

```
        <210> 297
        <211> 1855
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(1855)
        <223> n = A,T,C or G

        <400> 297
tgcacgcatc ggccagtgtc tgtgccacgt acactgacgc cccctgagat gtgcacgccg        60
cacgcgcacg ttgcacgcgc ggcagcggct tggctggctt gtaacggctt gcacgcgcac       120
gccgccccg cataaccgtc agactggcct gtaacggctt gcaggcgcac gccgcacgcg       180
cgtaacggct tggctgccct gtaacggctt gcacgtgcat gctgcacgcg cgttaacggc       240
ttggctggca tgtagccgct tggcttggct ttgcattytt tgctkggctk ggcgttgkty       300
tcttggattg acgcttcctc cttggatkga cgtttcctcc ttggatkgac gtttcytyty       360
tcgcgttcct ttgctggact tgaccttty tctgctgggt ttggcattcc tttggggtgg       420
gctgggtgtt ttctccgggg gggktkgccc ttcctggggt gggcgtgggk cgcccccagg       480
gggcgtgggc tttccccggg tgggtgtggg ttttcctggg gtggggtggg ctgtgctggg       540
atccccctgc tggggttggc agggattgac ttttttcttc aaacagattg gaaacccgga       600
gtaacntgct agttggtgaa actggttggt agacgcgatc tgctggtact actgtttctc       660
ctggctgtta aaagcagatg gtggctgagg ttgattcaat gccggctgct tcttctgtga       720
agaagccatt tggtctcagg agcaagatgg gcaagtggtg cgccactgct tcccctgctg       780
caggggagc ggcaagagca acgtgggcac ttctggagac cacaacgact cctctgtgaa       840
gacgcttggg agcaagaggt gcaagtggtg ctgcccactg cttcccctgc tgcagggag       900
cggcaagagc aacgtggkcg cttggggaga ctacgatgac agcgccttca tggakcccag       960
gtaccacgtc crtggagaag atctggacaa gctccacaga gctgcctggt ggggtaaagt      1020
ccccagaaag gatctcatcg tcatgctcag ggacactgay gtgaacaaga rggacaagca      1080
aaagaggact gctctacatc tggcctctgc caatgggaat tcagaagtag taaaactcgt      1140
gctggacaga cgatgtcaac ttaatgtcct tgacaacaaa aagaggacag ctctgacaaa      1200
ggccgtacaa tgccaggaag atgaatgtgc gttaatgttg ctggaacatg gcactgatcc      1260
```

```
aaatattcca gatgagtatg gaaataccac tctacactat gctgtctaca atgaagataa    1320
attaatggcc aaagcactgc tcttatacgg tgctgatatc gaatcaaaaa acaaggtata    1380
gatctactaa ttttatcttc aaaatactga aatgcattca ttttaacatt gacgtgtgta    1440
agggccagtc ttccgtattt ggaagctcaa gcataacttg aatgaaaata ttttgaaatg    1500
acctaattat ctaagacttt attttaaata ttgttatttt caaagaagca ttagagggta    1560
cagttttttt tttttaaatg cacttctggt aaatactttt gttgaaaaca ctgaatttgt    1620
aaaaggtaat acttactatt tttcaatttt tccctcctag gatttttttc ccctaatgaa    1680
tgtaagatgg caaaatttgc cctgaaatag gttttacatg aaaactccaa gaaaagttaa    1740
acatgtttca gtgaatagag atcctgctcc tttggcaagt tcctaaaaaa cagtaataga    1800
tacgaggtga tgcgcctgtc agtggcaagg tttaagatat ttctgatctc gtgcc         1855
```

```
        <210>  298
        <211>  1059
        <212>  DNA
        <213>  Homo sapien


        <400>  298
gcaacgtggg cacttctgga gaccacaacg actcctctgt gaagacgctt gggagcaaga      60
ggtgcaagtg gtgctgccca ctgcttcccc tgctgcaggg gagcggcaag agcaacgtgg     120
gcgcttgrgg agactmcgat gacagygcct tcatggagcc caggtaccac gtccgtggag     180
aagatctgga caagctccac agagctgccc tggtggggta aagtccccag aaaggatctc     240
atcgtcatgc tcagggacac tgaygtgaac aagarggaca agcaaaagag gactgctcta     300
catctggcct ctgccaatgg gaattcagaa gtagtaaaac tcstgctgga cagacgatgt     360
caacttaatg tccttgacaa caaaaagagg acagctctga yaaaggccgt acaatgccag     420
gaagatgaat gtgcgttaat gttgctggaa catggcactg atccaaatat tccagatgag     480
tatggaaata ccactctrca ctaygctrtc tayaatgaag ataaattaat ggccaaagca     540
ctgctcttat ayggtgctga tatcgaatca aaaaacaagg tatagatcta ctaatttat      600
cttcaaaata ctgaaatgca ttcattttaa cattgacgtg tgtaagggcc agtcttccgt     660
atttggaagc tcaagcataa cttgaatgaa aatattttga aatgacctaa ttatctaaga     720
ctttatttta aatattgtta ttttcaaaga agcattagag ggtacagttt tttttttta     780
aatgcacttc tggtaaatac ttttgttgaa aacactgaat ttgtaaaagg taatacttac     840
tattttttcaa ttttttcctc ctaggatttt tttcccctaa tgaatgtaag atggcaaaat     900
ttgccctgaa ataggtttta catgaaaact ccaagaaaag ttaaacatgt tttcagtgaat     960
agagatcctg ctcctttggc aagttcctaa aaaacagtaa tagatacgag gtgatgcgcc    1020
tgtcagtggc aaggtttaag atatttctga tctcgtgcc                          1059
```

```
        <210>  299
        <211>  329
        <212>  PRT
        <213>  Homo sapien


        <400>  299
Met Asp Ile Val Val Ser Gly Ser His Pro Leu Trp Val Asp Ser Phe
1               5                   10                  15
Leu His Leu Ala Gly Ser Asp Leu Leu Ser Arg Ser Leu Met Ala Glu
            20                  25                  30
Glu Tyr Thr Ile Val His Ala Ser Phe Ile Ser Cys Ile Ser Ser Ser
        35                  40                  45
Leu Asp Gly Gln Gly Glu Arg Gln Glu Gln Arg Gly His Phe Trp Arg
    50                  55                  60
Pro Gln Arg Leu Leu Cys Glu Asp Ala Trp Glu Gln Glu Val Gln Val
```

```
65                        70                        75                        80
Val Leu Pro Leu Leu Pro Leu Leu Gln Gly Ser Gly Lys Ser Asn Val
                        85                        90                        95
Val Ala Trp Gly Asp Tyr Asp Asp Ser Ala Phe Met Asp Pro Arg Tyr
                    100                       105                       110
His Val His Gly Glu Asp Leu Asp Lys Leu His Arg Ala Ala Trp Trp
                    115                       120                       125
Gly Lys Val Pro Arg Lys Asp Leu Ile Val Met Leu Arg Asp Thr Asp
                    130                       135                       140
Val Asn Lys Arg Asp Lys Gln Lys Arg Thr Ala Leu His Leu Ala Ser
145                       150                       155                       160
Ala Asn Gly Asn Ser Glu Val Val Lys Leu Val Leu Asp Arg Arg Cys
                    165                       170                       175
Gln Leu Asn Val Leu Asp Asn Lys Lys Arg Thr Ala Leu Thr Lys Ala
                    180                       185                       190
Val Gln Cys Gln Glu Asp Glu Cys Ala Leu Met Leu Leu Glu His Gly
                    195                       200                       205
Thr Asp Pro Asn Ile Pro Asp Glu Tyr Gly Asn Thr Thr Leu His Tyr
                    210                       215                       220
Ala Val Tyr Asn Glu Asp Lys Leu Met Ala Lys Ala Leu Leu Leu Tyr
225                       230                       235                       240
Gly Ala Asp Ile Glu Ser Lys Asn Lys His Gly Leu Thr Pro Leu Leu
                    245                       250                       255
Leu Gly Ile His Glu Gln Lys Gln Gln Val Val Lys Phe Leu Ile Lys
                    260                       265                       270
Lys Lys Ala Asn Leu Asn Ala Leu Asp Arg Tyr Gly Arg Thr Ala Leu
                    275                       280                       285
Ile Leu Ala Val Cys Cys Gly Ser Ala Ser Ile Val Ser Pro Leu Leu
                    290                       295                       300
Glu Gln Asn Val Asp Val Ser Ser Gln Asp Leu Glu Arg Arg Pro Glu
305                       310                       315                       320
Ser Met Leu Phe Leu Val Ile Ile Met
                    325

        <210> 300
        <211> 148
        <212> PRT
        <213> Homo sapien

        <220>
        <221> VARIANT
        <222> (1)...(148)
        <223> Xaa = Any Amino Acid

        <400> 300
Met Thr Xaa Pro Ser Trp Ser Pro Gly Thr Thr Ser Val Glu Lys Ile
  1               5                   10                  15
Trp Thr Ser Ser Thr Glu Leu Pro Trp Trp Gly Lys Val Pro Arg Lys
            20                  25                  30
Asp Leu Ile Val Met Leu Arg Asp Thr Asp Val Asn Lys Xaa Asp Lys
            35                  40                  45
```

Gln Lys Arg Thr Ala Leu His Leu Ala Ser Ala Asn Gly Asn Ser Glu
    50   55   60
Val Val Lys Leu Xaa Leu Asp Arg Arg Cys Gln Leu Asn Val Leu Asp
65   70   75   80
Asn Lys Lys Arg Thr Ala Leu Xaa Lys Ala Val Gln Cys Gln Glu Asp
        85   90   95
Glu Cys Ala Leu Met Leu Leu Glu His Gly Thr Asp Pro Asn Ile Pro
        100   105   110
Asp Glu Tyr Gly Asn Thr Thr Leu His Tyr Ala Xaa Tyr Asn Glu Asp
        115   120   125
Lys Leu Met Ala Lys Ala Leu Leu Leu Tyr Gly Ala Asp Ile Glu Ser
        130   135   140
Lys Asn Lys Val
145

```
        <210> 301
        <211> 1155
        <212> DNA
        <213> Homo sapien

        <400> 301
atggtggttg aggttgattc catgccggct gcctcttctg tgaagaagcc atttggtctc        60
aggagcaaga tgggcaagtg gtgctgccgt tgcttcccct gctgcaggga gagcggcaag       120
agcaacgtgg gcacttctgg agaccacgac gactctgcta tgaagacact caggagcaag       180
atgggcaagt ggtgccgcca ctgcttcccc tgctgcaggg ggagtggcaa gagcaacgtg       240
ggcgcttctg agaccacga  cgactctgct atgaagacac tcaggaacaa gatgggcaag       300
tggtgctgcc actgcttccc ctgctgcagg gggagcggca gagcaaggt  gggcgcttgg       360
ggagactacg atgacagtgc cttcatggag cccaggtacc acgtccgtgg agaagatctg       420
gacaagctcc acagagctgc ctggtggggt aaagtcccca gaaaggatct catcgtcatg       480
ctcagggaca ctgacgtgaa caagaaggac aagcaaaaga ggactgctct acatctggcc       540
tctgccaatg ggaattcaga agtagtaaaa ctcctgctgg acagacgatg tcaacttaat       600
gtccttgaca acaaaaagag gacagctctg ataaaggccg tacaatgcca ggaagatgaa       660
tgtgcgttaa tgttgctgga acatggcact gatccaaata ttccagatga gtatggaaat       720
accactctgc actacgctat ctataatgaa gataaattaa tggccaaagc actgctctta       780
tatggtgctg atatcgaatc aaaaaacaag catggcctca caccactgtt acttggtgta       840
catgagcaaa aacagcaagt cgtgaaattt ttaatcaaga aaaaagcgaa tttaaatgca       900
ctggatagat atggaaggac tgctctcata cttgctgtat gttgtggatc agcaagtata       960
gtcagccttc tacttgagca aaatattgat gtatcttctc aagatctatc tggacagacg      1020
gccagagagt atgctgtttc tagtcatcat catgtaattt gccagttact ttctgactac      1080
aaagaaaaac agatgctaaa aatctcttct gaaaacagca atccagaaaa tgtctcaaga      1140
accagaaata aataa                                                       1155

        <210> 302
        <211> 2000
        <212> DNA
        <213> Homo sapien

        <400> 302
atggtggttg aggttgattc catgccggct gcctcttctg tgaagaagcc atttggtctc        60
aggagcaaga tgggcaagtg gtgctgccgt tgcttcccct gctgcaggga gagcggcaag       120
agcaacgtgg gcacttctgg agaccacgac gactctgcta tgaagacact caggagcaag       180
```

```
atgggcaagt ggtgccgcca ctgcttcccc tgctgcaggg ggagtggcaa gagcaacgtg      240
ggcgcttctg gagaccacga cgactctgct atgaagacac tcaggaacaa gatgggcaag      300
tggtgctgcc actgcttccc ctgctgcagg gggagcggca agagcaaggt gggcgcttgg      360
ggagactacg atgacagtgc cttcatggag cccaggtacc acgtccgtgg agaagatctg      420
gacaagctcc acagagctgc ctggtggggt aaagtcccca gaaaggatct catcgtcatg      480
ctcagggaca ctgacgtgaa caagaaggac aagcaaaaga ggactgctct acatctggcc      540
tctgccaatg ggaattcaga agtagtaaaa ctcctgctgg acagacgatg tcaacttaat      600
gtccttgaca acaaaaagag gacagctctg ataaaggccg tacaatgcca ggaagatgaa      660
tgtgcgttaa tgttgctgga acatggcact gatccaaata ttccagatga gtatggaaat      720
accactctgc actacgctat ctataatgaa gataaattaa tggccaaagc actgctctta      780
tatggtgctg atatcgaatc aaaaaacaag catggcctca caccactgtt acttggtgta      840
catgagcaaa aacagcaagt cgtgaaattt ttaatcaaga aaaaagcgaa tttaaatgca      900
ctggatagat atggaaggac tgctctcata cttgctgtat gttgtggatc agcaagtata      960
gtcagccttc tacttgagca aaatattgat gtatcttctc aagatctatc tggacagacg     1020
gccagagagt atgctgtttc tagtcatcat catgtaattt gccagttact ttctgactac     1080
aaagaaaaac agatgctaaa aatctcttct gaaaacagca atccagaaca agacttaaag     1140
ctgacatcag aggaagagtc acaaaggttc aaaggcagtg aaaatagcca gccagagaaa     1200
atgtctcaag aaccagaaat aaataaggat ggtgatagag aggttgaaga agaaatgaag     1260
aagcatgaaa gtaataatgt gggattacta gaaaacctga ctaatggtgt cactgctggc     1320
aatggtgata atggattaat tcctcaaagg aagagcagaa cacctgaaaa tcagcaattt     1380
cctgacaacg aaagtgaaga gtatcacaga atttgcgaat tagtttctga ctacaaagaa     1440
aaacagatgc caaaatactc ttctgaaaac agcaacccag aacaagactt aaagctgaca     1500
tcagaggaag agtcacaaag gcttgagggc agtgaaaatg ccagccaga gctagaaaat       1560
tttatggcta tcgaagaaat gaagaagcac ggaagtactc atgtcggatt cccagaaaac     1620
ctgactaatg gtgccactgc tggcaatggt gatgatggat taattcctcc aaggaagagc     1680
agaacacctg aaagccagca atttcctgac actgagaatg aagagtatca cagtgacgaa     1740
caaaatgata ctcagaagca attttgtgaa gaacagaaca ctggaatatt acacgatgag     1800
attctgattc atgaagaaaa gcagatagaa gtggttgaaa aaatgaattc tgagctttct     1860
cttagttgta agaaagaaaa agacatcttg catgaaaata gtacgttgcg ggaagaaatt     1920
gccatgctaa gactggagct agacacaatg aaacatcaga gccagctaaa aaaaaaaaaa     1980
aaaaaaaaaa aaaaaaaaaa                                                 2000
```

```
<210> 303
<211> 2040
<212> DNA
<213> Homo sapien
```

```
<400> 303
atggtggttg aggttgattc catgccggct gcctcttctg tgaagaagcc atttggtctc       60
aggagcaaga tgggcaagtg gtgctgccgt tgcttcccct gctgcaggga gagcggcaag      120
agcaacgtgg gcacttctgg agaccacgac gactctgcta tgaagacact caggagcaag      180
atgggcaagt ggtgccgcca ctgcttcccc tgctgcaggg ggagtggcaa gagcaacgtg      240
ggcgcttctg gagaccacga cgactctgct atgaagacac tcaggaacaa gatgggcaag      300
tggtgctgcc actgcttccc ctgctgcagg gggagcggca agagcaaggt gggcgcttgg      360
ggagactacg atgacagtgc cttcatggag cccaggtacc acgtccgtgg agaagatctg      420
gacaagctcc acagagctgc ctggtggggt aaagtcccca gaaaggatct catcgtcatg      480
ctcagggaca ctgacgtgaa caagaaggac aagcaaaaga ggactgctct acatctggcc      540
tctgccaatg ggaattcaga agtagtaaaa ctcctgctgg acagacgatg tcaacttaat      600
gtccttgaca acaaaaagag gacagctctg ataaaggccg tacaatgcca ggaagatgaa      660
tgtgcgttaa tgttgctgga acatggcact gatccaaata ttccagatga gtatggaaat      720
accactctgc actacgctat ctataatgaa gataaattaa tggccaaagc actgctctta      780
```

```
tatggtgctg atatcgaatc aaaaaacaag catggcctca caccactgtt acttggtgta     840
catgagcaaa aacagcaagt cgtgaaattt ttaatcaaga aaaaagcgaa tttaaatgca     900
ctggatagat atggaaggac tgctctcata cttgctgtat gttgtggatc agcaagtata     960
gtcagccttc tacttgagca aaatattgat gtatcttctc aagatctatc tggacagacg    1020
gccagagagt atgctgtttc tagtcatcat catgtaattt gccagttact ttctgactac    1080
aaagaaaaac agatgctaaa aatctcttct gaaacagca atccagaaca agacttaaag     1140
ctgacatcag aggaagagtc acaaggttc aaaggcagtg aaaatagcca gccagagaaa     1200
atgtctcaag aaccagaaat aaataaggat ggtgatagag aggttgaaga agaaatgaag    1260
aagcatgaaa gtaataatgt gggattacta gaaaacctga ctaatggtgt cactgctggc    1320
aatggtgata atggattaat tcctcaaagg aagagcagaa cacctgaaaa tcagcaattt    1380
cctgacaacg aaagtgaaga gtatcacaga atttgcgaat tagtttctga ctacaaagaa    1440
aaacagatgc caaaatactc ttctgaaaac agcaacccag aacaagactt aaagctgaca    1500
tcagaggaag agtcacaaag gcttgagggc agtgaaaatg gccagccaga gaaaagatct    1560
caagaaccag aaataaataa ggatggtgat agagagctag aaaattttat ggctatcgaa    1620
gaaatgaaga agcacggaag tactcatgtc ggattcccag aaaacctgac taatggtgcc    1680
actgctggca atggtgatga tggattaatt cctccaagga gagcagaac acctgaaagc    1740
cagcaatttc ctgacactga gaatgaagag tatcacagtg acgaacaaaa tgatactcag    1800
aagcaatttt gtgaagaaca gaacactgga atattacacg atgagattct gattcatgaa    1860
gaaaagcaga tagaagtggt tgaaaaaatg aattctgagc tttctcttag ttgtaagaaa    1920
gaaaaagaca tcttgcatga aaatagtacg ttgcgggaag aaattgccat gctaagactg    1980
gagctagaca caatgaaaca tcagagccag ctaaaaaaaa aaaaaaaaaa aaaaaaaaaa    2040
```

```
        <210>  304
        <211>  384
        <212>  PRT
        <213>  Homo sapien


        <400>  304
Met Val Val Glu Val Asp Ser Met Pro Ala Ala Ser Ser Val Lys Lys
1               5                   10                  15
Pro Phe Gly Leu Arg Ser Lys Met Gly Lys Trp Cys Cys Arg Cys Phe
                20                  25                  30
Pro Cys Cys Arg Glu Ser Gly Lys Ser Asn Val Gly Thr Ser Gly Asp
            35                  40                  45
His Asp Asp Ser Ala Met Lys Thr Leu Arg Ser Lys Met Gly Lys Trp
    50                  55                  60
Cys Arg His Cys Phe Pro Cys Cys Arg Gly Ser Gly Lys Ser Asn Val
65                  70                  75                  80
Gly Ala Ser Gly Asp His Asp Asp Ser Ala Met Lys Thr Leu Arg Asn
                85                  90                  95
Lys Met Gly Lys Trp Cys Cys His Cys Phe Pro Cys Cys Arg Gly Ser
            100                 105                 110
Gly Lys Ser Lys Val Gly Ala Trp Gly Asp Tyr Asp Asp Ser Ala Phe
        115                 120                 125
Met Glu Pro Arg Tyr His Val Arg Gly Glu Asp Leu Asp Lys Leu His
    130                 135                 140
Arg Ala Ala Trp Trp Gly Lys Val Pro Arg Lys Asp Leu Ile Val Met
145                 150                 155                 160
Leu Arg Asp Thr Asp Val Asn Lys Lys Asp Lys Gln Lys Arg Thr Ala
                165                 170                 175
Leu His Leu Ala Ser Ala Asn Gly Asn Ser Glu Val Val Lys Leu Leu
```

```
                180                    185                      190
Leu Asp Arg Arg Cys Gln Leu Asn Val Leu Asp Asn Lys Lys Arg Thr
        195                    200                  205
Ala Leu Ile Lys Ala Val Gln Cys Gln Glu Asp Glu Cys Ala Leu Met
        210                    215                  220
Leu Leu Glu His Gly Thr Asp Pro Asn Ile Pro Asp Glu Tyr Gly Asn
225                    230                    235                  240
Thr Thr Leu His Tyr Ala Ile Tyr Asn Glu Asp Lys Leu Met Ala Lys
            245                    250                  255
Ala Leu Leu Leu Tyr Gly Ala Asp Ile Glu Ser Lys Asn Lys His Gly
            260                    265                  270
Leu Thr Pro Leu Leu Leu Gly Val His Glu Gln Lys Gln Gln Val Val
            275                    280                  285
Lys Phe Leu Ile Lys Lys Lys Ala Asn Leu Asn Ala Leu Asp Arg Tyr
        290                    295                  300
Gly Arg Thr Ala Leu Ile Leu Ala Val Cys Cys Gly Ser Ala Ser Ile
305                    310                    315                  320
Val Ser Leu Leu Leu Glu Gln Asn Ile Asp Val Ser Ser Gln Asp Leu
            325                    330                  335
Ser Gly Gln Thr Ala Arg Glu Tyr Ala Val Ser Ser His His His Val
            340                    345                  350
Ile Cys Gln Leu Leu Ser Asp Tyr Lys Glu Lys Gln Met Leu Lys Ile
        355                    360                  365
Ser Ser Glu Asn Ser Asn Pro Glu Asn Val Ser Arg Thr Arg Asn Lys
370                    375                    380
```

```
        <210> 305
        <211> 656
        <212> PRT
        <213> Homo sapien

        <400> 305
Met Val Val Glu Val Asp Ser Met Pro Ala Ala Ser Ser Val Lys Lys
1               5                    10                  15
Pro Phe Gly Leu Arg Ser Lys Met Gly Lys Trp Cys Cys Arg Cys Phe
            20                    25                  30
Pro Cys Cys Arg Glu Ser Gly Lys Ser Asn Val Gly Thr Ser Gly Asp
        35                    40                  45
His Asp Asp Ser Ala Met Lys Thr Leu Arg Ser Lys Met Gly Lys Trp
    50                    55                  60
Cys Arg His Cys Phe Pro Cys Cys Arg Gly Ser Gly Lys Ser Asn Val
65                    70                    75                  80
Gly Ala Ser Gly Asp His Asp Asp Ser Ala Met Lys Thr Leu Arg Asn
            85                    90                  95
Lys Met Gly Lys Trp Cys Cys His Cys Phe Pro Cys Cys Arg Gly Ser
        100                    105                  110
Gly Lys Ser Lys Val Gly Ala Trp Gly Asp Tyr Asp Asp Ser Ala Phe
        115                    120                  125
Met Glu Pro Arg Tyr His Val Arg Gly Glu Asp Leu Asp Lys Leu His
130                    135                    140
Arg Ala Ala Trp Trp Gly Lys Val Pro Arg Lys Asp Leu Ile Val Met
```

```
145                      150                      155                      160
Leu Arg Asp Thr Asp Val Asn Lys Lys Asp Lys Gln Lys Arg Thr Ala
            165                      170                      175
Leu His Leu Ala Ser Ala Asn Gly Asn Ser Glu Val Val Lys Leu Leu
            180                      185                      190
Leu Asp Arg Arg Cys Gln Leu Asn Val Leu Asp Asn Lys Lys Arg Thr
            195                      200                      205
Ala Leu Ile Lys Ala Val Gln Cys Gln Glu Asp Glu Cys Ala Leu Met
    210                      215                      220
Leu Leu Glu His Gly Thr Asp Pro Asn Ile Pro Asp Glu Tyr Gly Asn
225                      230                      235                      240
Thr Thr Leu His Tyr Ala Ile Tyr Asn Glu Asp Lys Leu Met Ala Lys
            245                      250                      255
Ala Leu Leu Leu Tyr Gly Ala Asp Ile Glu Ser Lys Asn Lys His Gly
            260                      265                      270
Leu Thr Pro Leu Leu Leu Gly Val His Glu Gln Lys Gln Gln Val Val
            275                      280                      285
Lys Phe Leu Ile Lys Lys Lys Ala Asn Leu Asn Ala Leu Asp Arg Tyr
    290                      295                      300
Gly Arg Thr Ala Leu Ile Leu Ala Val Cys Cys Gly Ser Ala Ser Ile
305                      310                      315                      320
Val Ser Leu Leu Leu Glu Gln Asn Ile Asp Val Ser Ser Gln Asp Leu
            325                      330                      335
Ser Gly Gln Thr Ala Arg Glu Tyr Ala Val Ser Ser His His His Val
            340                      345                      350
Ile Cys Gln Leu Leu Ser Asp Tyr Lys Glu Lys Gln Met Leu Lys Ile
            355                      360                      365
Ser Ser Glu Asn Ser Asn Pro Glu Gln Asp Leu Lys Leu Thr Ser Glu
    370                      375                      380
Glu Glu Ser Gln Arg Phe Lys Gly Ser Glu Asn Ser Gln Pro Glu Lys
385                      390                      395                      400
Met Ser Gln Glu Pro Glu Ile Asn Lys Asp Gly Asp Arg Glu Val Glu
            405                      410                      415
Glu Glu Met Lys Lys His Glu Ser Asn Asn Val Gly Leu Leu Glu Asn
            420                      425                      430
Leu Thr Asn Gly Val Thr Ala Gly Asn Gly Asp Asn Gly Leu Ile Pro
            435                      440                      445
Gln Arg Lys Ser Arg Thr Pro Glu Asn Gln Gln Phe Pro Asp Asn Glu
    450                      455                      460
Ser Glu Glu Tyr His Arg Ile Cys Glu Leu Val Ser Asp Tyr Lys Glu
465                      470                      475                      480
Lys Gln Met Pro Lys Tyr Ser Ser Glu Asn Ser Asn Pro Glu Gln Asp
            485                      490                      495
Leu Lys Leu Thr Ser Glu Glu Glu Ser Gln Arg Leu Glu Gly Ser Glu
    500                      505                      510
Asn Gly Gln Pro Glu Leu Glu Asn Phe Met Ala Ile Glu Glu Met Lys
    515                      520                      525
Lys His Gly Ser Thr His Val Gly Phe Pro Glu Asn Leu Thr Asn Gly
    530                      535                      540
Ala Thr Ala Gly Asn Gly Asp Asp Gly Leu Ile Pro Pro Arg Lys Ser
545                      550                      555                      560
```

```
Arg Thr Pro Glu Ser Gln Gln Phe Pro Asp Thr Glu Asn Glu Glu Tyr
            565               570               575
His Ser Asp Glu Gln Asn Asp Thr Gln Lys Gln Phe Cys Glu Glu Gln
            580               585               590
Asn Thr Gly Ile Leu His Asp Glu Ile Leu Ile His Glu Glu Lys Gln
            595               600               605
Ile Glu Val Val Glu Lys Met Asn Ser Glu Leu Ser Leu Ser Cys Lys
    610               615               620
Lys Glu Lys Asp Ile Leu His Glu Asn Ser Thr Leu Arg Glu Glu Ile
625               630               635               640
Ala Met Leu Arg Leu Glu Leu Asp Thr Met Lys His Gln Ser Gln Leu
            645               650               655
```

```
<210> 306
<211> 671
<212> PRT
<213> Homo sapien
```

```
<400> 306
Met Val Val Glu Val Asp Ser Met Pro Ala Ala Ser Ser Val Lys Lys
1               5               10               15
Pro Phe Gly Leu Arg Ser Lys Met Gly Lys Trp Cys Cys Arg Cys Phe
            20               25               30
Pro Cys Cys Arg Glu Ser Gly Lys Ser Asn Val Gly Thr Ser Gly Asp
            35               40               45
His Asp Asp Ser Ala Met Lys Thr Leu Arg Ser Lys Met Gly Lys Trp
    50               55               60
Cys Arg His Cys Phe Pro Cys Cys Arg Gly Ser Gly Lys Ser Asn Val
65               70               75               80
Gly Ala Ser Gly Asp His Asp Asp Ser Ala Met Lys Thr Leu Arg Asn
            85               90               95
Lys Met Gly Lys Trp Cys Cys His Cys Phe Pro Cys Cys Arg Gly Ser
            100               105               110
Gly Lys Ser Lys Val Gly Ala Trp Gly Asp Tyr Asp Asp Ser Ala Phe
            115               120               125
Met Glu Pro Arg Tyr His Val Arg Gly Glu Asp Leu Asp Lys Leu His
    130               135               140
Arg Ala Ala Trp Trp Gly Lys Val Pro Arg Lys Asp Leu Ile Val Met
145               150               155               160
Leu Arg Asp Thr Asp Val Asn Lys Lys Asp Lys Gln Lys Arg Thr Ala
            165               170               175
Leu His Leu Ala Ser Ala Asn Gly Asn Ser Glu Val Val Lys Leu Leu
            180               185               190
Leu Asp Arg Arg Cys Gln Leu Asn Val Leu Asp Asn Lys Lys Arg Thr
            195               200               205
Ala Leu Ile Lys Ala Val Gln Cys Gln Glu Asp Glu Cys Ala Leu Met
    210               215               220
Leu Leu Glu His Gly Thr Asp Pro Asn Ile Pro Asp Glu Tyr Gly Asn
225               230               235               240
Thr Thr Leu His Tyr Ala Ile Tyr Asn Glu Asp Lys Leu Met Ala Lys
            245               250               255
```

```
Ala Leu Leu Leu Tyr Gly Ala Asp Ile Glu Ser Lys Asn Lys His Gly
        260             265             270
Leu Thr Pro Leu Leu Leu Gly Val His Glu Gln Lys Gln Gln Val Val
        275             280             285
Lys Phe Leu Ile Lys Lys Lys Ala Asn Leu Asn Ala Leu Asp Arg Tyr
    290             295             300
Gly Arg Thr Ala Leu Ile Leu Ala Val Cys Cys Gly Ser Ala Ser Ile
305             310             315             320
Val Ser Leu Leu Leu Glu Gln Asn Ile Asp Val Ser Ser Gln Asp Leu
                325             330             335
Ser Gly Gln Thr Ala Arg Glu Tyr Ala Val Ser Ser His His His Val
            340             345             350
Ile Cys Gln Leu Leu Ser Asp Tyr Lys Glu Lys Gln Met Leu Lys Ile
        355             360             365
Ser Ser Glu Asn Ser Asn Pro Glu Gln Asp Leu Lys Leu Thr Ser Glu
    370             375             380
Glu Glu Ser Gln Arg Phe Lys Gly Ser Glu Asn Ser Gln Pro Glu Lys
385             390             395             400
Met Ser Gln Glu Pro Glu Ile Asn Lys Asp Gly Asp Arg Glu Val Glu
                405             410             415
Glu Glu Met Lys Lys His Glu Ser Asn Asn Val Gly Leu Leu Glu Asn
            420             425             430
Leu Thr Asn Gly Val Thr Ala Gly Asn Gly Asp Asn Gly Leu Ile Pro
            435             440             445
Gln Arg Lys Ser Arg Thr Pro Glu Asn Gln Gln Phe Pro Asp Asn Glu
    450             455             460
Ser Glu Glu Tyr His Arg Ile Cys Glu Leu Val Ser Asp Tyr Lys Glu
465             470             475             480
Lys Gln Met Pro Lys Tyr Ser Ser Glu Asn Ser Asn Pro Glu Gln Asp
            485             490             495
Leu Lys Leu Thr Ser Glu Glu Glu Ser Gln Arg Leu Glu Gly Ser Glu
            500             505             510
Asn Gly Gln Pro Glu Lys Arg Ser Gln Glu Pro Glu Ile Asn Lys Asp
    515             520             525
Gly Asp Arg Glu Leu Glu Asn Phe Met Ala Ile Glu Glu Met Lys Lys
    530             535             540
His Gly Ser Thr His Val Gly Phe Pro Glu Asn Leu Thr Asn Gly Ala
545             550             555             560
Thr Ala Gly Asn Gly Asp Asp Gly Leu Ile Pro Pro Arg Lys Ser Arg
            565             570             575
Thr Pro Glu Ser Gln Gln Phe Pro Asp Thr Glu Asn Glu Glu Tyr His
        580             585             590
Ser Asp Glu Gln Asn Asp Thr Gln Lys Gln Phe Cys Glu Glu Gln Asn
    595             600             605
Thr Gly Ile Leu His Asp Glu Ile Leu Ile His Glu Glu Lys Gln Ile
    610             615             620
Glu Val Val Glu Lys Met Asn Ser Glu Leu Ser Leu Ser Cys Lys Lys
625             630             635             640
Glu Lys Asp Ile Leu His Glu Asn Ser Thr Leu Arg Glu Glu Ile Ala
            645             650             655
Met Leu Arg Leu Glu Leu Asp Thr Met Lys His Gln Ser Gln Leu
```

660   665   670

<210> 307
<211> 800
<212> DNA
<213> Homo sapien

<400> 307
atkagcttcc gcttctgaca acactagaga tccctcccct ccctcagggt atggccctcc   60
acttcatttt tggtacataa catctttata ggacaggggt aaaatcccaa tactaacagg   120
agaatgctta ggactctaac aggttttttga gaatgtgttg gtaagggcca ctcaatccaa   180
tttttcttgg tcctccttgt ggtctaggag gacaggcaag ggtgcagatt ttcaagaatg   240
catcagtaag ggccactaaa tccgaccttc ctcgttcctc cttgtggtct gggaggaaaa   300
ctagtgtttc tgttgctgtg tcagtgagca caactattcc gatcagcagg gtccagggac   360
cactgcaggt tcttgggcag ggggagaaac aaaacaaacc aaaaccatgg gcrgttttgt   420
ctttcagatg ggaaacactc aggcatcaac aggctcacct ttgaaatgca tcctaagcca   480
atgggacaaa tttgacccac aaaccctgga aaaagaggtg gctcattttt tttgcactat   540
ggcttggccc caacattctc tctctgatgg ggaaaaatgg ccacctgagg gaagtacaga   600
ttacaatact atcctgcagc ttgacctttt ctgtaagagg gaaggcaaat ggagtgaaat   660
accttatgtc caagctttct tttcattgaa ggagaataca ctatgcaaag cttgaaattt   720
acatcccaca ggaggacctc tcagcttacc cccatatcct agcctcccta tagctcccta   780
tcctattagt gataagcctc   800

<210> 308
<211> 102
<212> PRT
<213> Homo sapien

<220>
<221> VARIANT
<222> (1)...(102)
<223> Xaa = Any Amino Acid

<400> 308
Met Gly Xaa Phe Val Phe Gln Met Gly Asn Thr Gln Ala Ser Thr Gly
1   5   10   15
Ser Pro Leu Lys Cys Ile Leu Ser Gln Trp Asp Lys Phe Asp Pro Gln
            20   25   30
Thr Leu Glu Lys Glu Val Ala His Phe Phe Cys Thr Met Ala Trp Pro
        35   40   45
Gln His Ser Leu Ser Asp Gly Glu Lys Trp Pro Pro Glu Gly Ser Thr
    50   55   60
Asp Tyr Asn Thr Ile Leu Gln Leu Asp Leu Phe Cys Lys Arg Glu Gly
65   70   75   80
Lys Trp Ser Glu Ile Pro Tyr Val Gln Ala Phe Phe Ser Leu Lys Glu
                85   90   95
Asn Thr Leu Cys Lys Ala
            100

<210> 309
<211> 9

```
<212> PRT
<213> Artificial Sequence

<220>
<223> Made in the lab

<400> 309
Leu Met Ala Glu Glu Tyr Thr Ile Val
 1               5


<210> 310
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Made in the lab

<400> 310
Lys Leu Met Ala Lys Ala Leu Leu Leu
 1               5


<210> 311
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Made in the lab

<400> 311
Gly Leu Thr Pro Leu Leu Leu Gly Ile
 1               5


<210> 312
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Made in the lab

<400> 312
Lys Leu Val Leu Asp Arg Arg Cys Gln Leu
 1               5                   10


<210> 313
<211> 1852
<212> DNA
<213> Homo sapiens
```

<400> 313
ggcacgagaa ttaaaaccct cagcaaaaca ggcatagaag ggacatacct taaagtaata 60
aaaaccacct atgacaagcc cacagccaac ataatactaa atggggaaaa gttagaagca 120
tttcctctga gaactgcaac aataaataca aggatgctgg attttgtcaa atgccttttc 180
tgtgtctgtt gagatgctta tgtgactttg cttttaattc tgtttatgtg attatcacat 240
ttattgactt gcctgtgtta gaccggaaga gctggggtgt ttctcaggag ccaccgtgtg 300
ctgcggcagc ttcgggataa cttgaggctg catcactggg gaagaaacac aytcctgtcc 360
gtggcgctga tggctgagga cagagcttca gtgtggcttc tctgcgactg gcttcttcgg 420
ggagttcttc cttcatagtt catccatatg gctccagagg aaaattatat tattttgtta 480
tggatgaaga gtattacgtt gtgcagatat actgcagtgt cttcatctct tgatgtgtga 540
ttgggtaggt tccaccatgt tgccgcagat gacatgattt cagtacctgt gtctggctga 600
aaagtgtttg tttgtgaatg gatattgtgg tttctggatc tcatcctctg tgggtggaca 660
gctttctcca ccttgctgga agtgacctgc tgtccagaag tttgatggct gaggagtata 720
ccatcgtgca tgcatctttc atttcctgca tttcttcctc cctggatgga caggggggagc 780
ggcaagagca acgtgggcac ttctggagac cacaacgact cctctgtgaa gacgcttggg 840
agcaagaggt gcaagtggtg ctgccactgc ttcccctgct gcaggggggag cggcaagagc 900
aacgtggtcg cttggggaga ctacgatgac agcgccttca tggatcccag gtaccacgtc 960
catggagaag atctggacaa gctccacaga gctgcctggt ggggtaaagt ccccagaaag 1020
gatctcatcg tcatgctcag ggacacggat gtgaacaaga gggacaagca aaagaggact 1080
gctctacatc tggcctctgc caatgggaat tcagaagtag taaaactcgt gctggacaga 1140
cgatgtcaac ttaatgtcct tgacaacaaa aagaggacag ctctgacaaa ggccgtacaa 1200
tgccaggaag atgaatgtgc gttaatgttg ctggaacatg gcactgatcc aaatattcca 1260
gatgagtatg gaaataccac tctacactat gctgtctaca atgaagataa attaatggcc 1320
aaagcactgc tcttatacgg tgctgatatc gaatcaaaaa acaagcatgg cctcacacca 1380
ctgctacttg gtatacatga gcaaaaacag caagtggtga aatttttaat caagaaaaaa 1440
gcgaatttaa atgcgctgga tagatatgga agaactgctc tcatacttgc tgtatgttgt 1500
ggatcagcaa gtatagtcag ccctctactt gagcaaaatg ttgatgtatc ttctcaagat 1560
ctggaaagac ggccagagag tatgctgttt ctagtcatca tcatgtaatt tgccagttac 1620
tttctgacta caaagaaaaa cagatgttaa aaatctcttc tgaaacagc aatccagaac 1680
aagacttaaa gctgacatca gaggaagagt cacaaaggct taaaggaagt gaaaacagcc 1740
agccagagct agaagattta tggctattga agaagaatga agaacacgga agtactcatg 1800
tgggattccc agaaaacctg actaacggtg ccgctgctgg caatggtgat ga   1852

<210> 314
<211> 879
<212> DNA
<213> Homo sapiens

<400> 314
atgcatctttt catttcctgc atttcttcct ccctggatgg acaggggggag cggcaagagc 60
aacgtgggca cttctggaga ccacaacgac tcctctgtga agacgcttgg gagcaagagg 120
tgcaagtggt gctgccactg cttcccctgc tgcaggggga gcggcaagag caacgtggtc 180
gcttggggag actacgatga cagcgccttc atggatccca ggtaccacgt ccatggagaa 240
gatctggaca agctccacag agctgcctgg tggggtaaag tccccagaaa ggatctcatc 300
gtcatgctca gggacacgga tgtgaacaag agggacaagc aaaagaggac tgctctacat 360
ctggcctctg ccaatgggaa ttcagaagta gtaaaactcg tgctggacag acgatgtcaa 420
cttaatgtcc ttgacaacaa aaagaggaca gctctgacaa aggccgtaca atgccaggaa 480
gatgaatgtg cgttaatgtt gctggaacat ggcactgatc caaatattcc agatgagtat 540
ggaaatacca ctctacacta tgctgtctac aatgaagata aattaatggc caaagcactg 600
ctcttatacg gtgctgatat cgaatcaaaa aacaagcatg gcctcacacc actgctactt 660
ggtatacatg agcaaaaaca gcaagtggtg aaatttttaa tcaagaaaaa agcgaattta 720

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aatgcgctgg atagatatgg aagaactgct ctcatacttg ctgtatgttg tggatcagca 780
agtatagtca gccctctact tgagcaaaat gttgatgtat cttctcaaga tctggaaaga 840
cggccagaga gtatgctgtt tctagtcatc atcatgtaa                        879
```

<210> 315
<211> 293
<212> PRT
<213> Homo sapiens

<400> 315

Met	His	Leu	Ser	Phe	Pro	Ala	Phe	Leu	Pro	Pro	Trp	Met	Asp	Arg	Gly
				5					10					15	

| Ser | Gly | Lys | Ser | Asn | Val | Gly | Thr | Ser | Gly | Asp | His | Asn | Asp | Ser | Ser |
| | | | 20 | | | | | 25 | | | | | 30 | | |

| Val | Lys | Thr | Leu | Gly | Ser | Lys | Arg | Cys | Lys | Trp | Cys | Cys | His | Cys | Phe |
| | | | 35 | | | | 40 | | | | | 45 | | | |

| Pro | Cys | Cys | Arg | Gly | Ser | Gly | Lys | Ser | Asn | Val | Val | Ala | Trp | Gly | Asp |
| | 50 | | | | | 55 | | | | | 60 | | | | |

| Tyr | Asp | Asp | Ser | Ala | Phe | Met | Asp | Pro | Arg | Tyr | His | Val | His | Gly | Glu |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |

| Asp | Leu | Asp | Lys | Leu | His | Arg | Ala | Ala | Trp | Trp | Gly | Lys | Val | Pro | Arg |
| | | | | 85 | | | | | 90 | | | | | 95 | |

| Lys | Asp | Leu | Ile | Val | Met | Leu | Arg | Asp | Thr | Asp | Val | Asn | Lys | Arg | Asp |
| | | | 100 | | | | | 105 | | | | | 110 | | |

| Lys | Gln | Lys | Arg | Thr | Ala | Leu | His | Leu | Ala | Ser | Ala | Asn | Gly | Asn | Ser |
| | | | 115 | | | | | 120 | | | | | 125 | | |

| Glu | Val | Val | Lys | Leu | Val | Leu | Asp | Arg | Arg | Cys | Gln | Leu | Asn | Val | Leu |
| | | 130 | | | | | 135 | | | | | 140 | | | |

| Asp | Asn | Lys | Lys | Arg | Thr | Ala | Leu | Thr | Lys | Ala | Val | Gln | Cys | Gln | Glu |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 |

| Asp | Glu | Cys | Ala | Leu | Met | Leu | Leu | Glu | His | Gly | Thr | Asp | Pro | Asn | Ile |
| | | | | 165 | | | | | 170 | | | | | 175 | |

| Pro | Asp | Glu | Tyr | Gly | Asn | Thr | Thr | Leu | His | Tyr | Ala | Val | Tyr | Asn | Glu |
| | | | 180 | | | | | 185 | | | | | 190 | | |

| Asp | Lys | Leu | Met | Ala | Lys | Ala | Leu | Leu | Leu | Tyr | Gly | Ala | Asp | Ile | Glu |
| | | | 195 | | | | | 200 | | | | | 205 | | |

| Ser | Lys | Asn | Lys | His | Gly | Leu | Thr | Pro | Leu | Leu | Leu | Gly | Ile | His | Glu |
| | | 210 | | | | | 215 | | | | | 220 | | | |

```
Gln Lys Gln Gln Val Val Lys Phe Leu Ile Lys Lys Lys Ala Asn Leu
225             230             235             240

Asn Ala Leu Asp Arg Tyr Gly Arg Thr Ala Leu Ile Leu Ala Val Cys
            245             250             255

Cys Gly Ser Ala Ser Ile Val Ser Pro Leu Leu Glu Gln Asn Val Asp
            260             265             270

Val Ser Ser Gln Asp Leu Glu Arg Arg Pro Glu Ser Met Leu Phe Leu
        275             280             285

Val Ile Ile Met
    290
```

```
<210> 316
<211> 584
<212> DNA
<213> Homo sapiens

<400> 316
agttgggcca aattcccctc cccctacagc ttgaagggga cataaccaat agcctggggt  60
ttttttgtgg tcctttggag atttctttgc ttattttctt ctgggtgggg gtgattagag 120
gaggcttatc actaatagga aggggagcta tagggaggct aggatatggg ggtaagctga 180
gaggtcctcc tgtgggatgt aaatttcaag ctttgcatag tgtattctcc ttcaatgaaa 240
agaaagcttg gacataaggt atttcactcc atttgccttc cctcttacag aaaaggtcaa 300
gctgcaggat agtattgtaa tctgtacttc cctcaggtgg ccatttttcc ccatcagaga 360
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